Entry and asymmetric lobbying: Why governments pick losers

Richard E. Baldwin
Graduate Institute of International Studies, Geneva
Frédéric Robert-Nicoud
London School of Economics & Political Science
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ABSTRACT

Governments frequently intervene to support domestic industries, but a surprising amount of this support goes to ailing sectors. We explain this with a lobbying model that allows for entry and sunk costs. Specifically, policy is influenced by pressure groups that incur lobbying expenses to create rents. In expanding industry, entry tends to erode such rents, but in declining industries, sunk costs rule out entry as long as the rents are not too high. This asymmetric appropriablity of rents means losers lobby harder. Thus it is not that government policy picks losers, it is that losers pick government policy.

1. Introduction

Governments that try to pick winners and losers usually choose the latter, according to an old adage. Some of the clearest examples come from trade policy. In the US and Europe, the most protected sectors – agriculture, textiles, clothing, footwear, steel and shipbuilding – have all been in decline for decades. Counter examples are rare. Even when a growing sector gets protection, such as the US semiconductor industry, the protection tends to focus on market segments – like memory chips – in which the domestic industry is losing ground. A related phenomenon is the 'NIMBY' syndrome (Not in My Back Yard) whereby special interest groups seem to fight harder to avoid loses than they do to achieve gains.

In searching for an accounting of this phenomenon the natural place to start is the political economy literature. The key approach for our purposes is the so-called 'pressure group' or lobbying approach that was launched by the classic papers of Stigler (1971) and Peltzman (1976) in the context of industrial regulation. The approach subsequently found a very natural home in the field of international trade after a series of papers showed that it provides important insights into why observed trade policy deviates so radically from welfare maximising policies. The path-breaking papers here are Hillman (1982), which took the political support function approach, and Findlay and Wellisz (1982), which introduced the tariff-formation function approach. More recently, the pressure-group approach been extended to include more explicit modelling of how lobbying expenditures affect policymakers' choices. Magee, Brock and Young (1989) work with a model where political contributions influence the outcome of elections, but the dominant model in this literature is now the 'protection for sale' model of Grossman and Helpman (1994). As Rodrik (1995)

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notes, the great advantage of this model is that it provides clear-cut micro foundations for lobbying and its effects in a tractable and fairly general setting.[2]

The loser's paradox

At the heart of the pressure-group approach is the presumption that special interest groups (SIGs) who spend the most on lobbying or other political activities are, other things equal, the ones that get the most government support. In this light, the success of sunset industries in winning a disproportionate share of government support is paradoxical. After all, lobbying dollars of expanding industries should be just as welcomed by politician as those of declining industries and an industry's ability to finance lobbying expenditures and its interest in obtaining government support should be positively related to its size, employment and/or profitability; one would expect the highest levels of government support in the biggest and strongest sectors rather than in ailing sectors. In the same light, the NIMBY syndrome – observed in issues ranging from health care reform to the location of landfill sites – is curious since lobbying to reverse losses and lobbying to secure new gains might be expected to be equally attractive to special interest groups.

Our paper uses the pressure-group approach – in particular that of Grossman and Helpman (1994) – to account for the surprising amount of support that goes to declining industries. Our basic story is simple. Government policy is influenced by pressure groups and such lobbying is expensive. Special interest groups spend the money in order to create rents that they can appropriate.[3] There is, however, a strong asymmetry in the ability of expanding and contracting industries to appropriate the benefits of lobbying. In an expanding industry, policy-created rents attract new entry that erodes the rents. In the extreme, free and instantaneous entry obviates all rents. This is not true in declining industries. Since sunk market-entry costs (e.g., unrecoverable investments in product development, training and brand name advertising) create quasi-rents, profits in declining industries can be raised without attracting entry as long as the level of quasi-rents does not rise above a normal rate of return on the sunk capital. Plainly, asymmetric appropriability implies an asymmetric incentive to lobby. The result is that losers lobby harder, so government policy doesn't pick losers; losers pick governments policy. A corollary to this reasoning accounts for the curious tendency of special interest groups to fight harder to avoid losses than they do to win new gains.

Literature Review

Many explanations of the loser's paradox have been suggested. One of the earliest and best known is the conservative social welfare function (CSWF) of Corden (1974). As Corden introduces it, "any significant absolute reduction in real incomes of any significant section of the community should be avoided. … In terms of welfare weights, increases in incomes are given relatively low weights and decreases very high weights." While this sort of government-with-a-heart explanation may have a good deal of explanatory power, it comes close to assuming the answer. Moreover at least in developed nations, governments have many policies for redistributing income and cushioning shocks (income taxes, unemployment insurance, retraining schemes, etc.), so even if "caring" were a major motive in government policy, an optimising government would separate industry support from pure income distribution considerations. An even more important critique is that the conservative social welfare function does not account for the fact that not all declining industries win massive

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[2] See Grossman and Helpman (2001) for a synthesis.

[3] Using US data, Gawande and Bandyopadhyay (2000) provide some evidence that protection is indeed 'for sale'. See footnote 5 below.

government support. In the 1980s for instance, the real wages of US unskilled workers fell substantially but only a small subset of these attracted government support. As the work of Goldberg and Maggi (1999) shows, well-organized sectors, for example US apparel workers, are the ones that induced the US government to adopt distortionary policies that softened the fall in their real incomes. In same spirit as the CSWF are the equity-concern model of Baldwin (1982) and the status-quo model of Lavergne (1983).

One of the most intuitive explanations for the loser's paradox turns on Anne Krueger's use of the "identity bias" to account for what she calls "asymmetries in the political market." The bias, according to Krueger (1990), is that people care more about the welfare of specific, known individuals than they do about unidentified, face-less individuals. To see how it could explain asymmetric government support, contrast the impact of a subsidy to a declining sector with one to an expanding industry. Both subsidies will alter the allocation of employment, but in the ailing industry the jobs 'saved' are identified *ex ante* with specific individuals, while the jobs created in the expanding sector cannot be identified with any specific individual, *ex ante*. In a way, this provides psycho-micro foundations, of the type associated with Schelling (1984), for the CSWF approach. As such, Krueger's explanation relies on the shape of policymakers' objective function and thus shares the shortcomings of the CSWF solution.

A related paper, but one that relies on more standard microeconomic behaviour, is Fernandez and Rodrik (1991). These authors use a mechanism that is related to the "identity bias" notion to account for the reluctance of governments to adopt changes in policies, i.e. reforms. To see this, consider a simple economy with 45% of workers in one sector and 55% in another and a hypothetical reform that will help workers in the initially small sector and hurt those in the initially big sector. Moreover, the reform will shift employment so that 60% of workers are eventually in the sector that is helped, i.e. the sector that was initially small. If each worker knew what her fate would be *ex ante*, the reform would easily garner support from a majority of workers. However, workers in the initially large sector do not know, *ex ante*, in which sector they will end up *ex post*; the probability that they move to the helped sector is quite small, just 15/55, so each one of them may oppose the reform *ex ante*. Notice that while the identity bias operates via the psychology of policymakers in the Krueger model, the Fernandez-Rodrik model relies on nothing more than individual rationality and the assumption of a random selection device.

Another solution with solid micro-foundations is proposed by Hillman (1989), who views trade policy as "social insurance" against exogenous changes in comparative advantage; this model could account for the asymmetric protection of "losers". Although it is difficult to discern the underlying forces in their model, Magee, Brock and Young (1989) also claim to explain asymmetric protection with their "compensation effect."

Another line of research that is tangentially related to the losers' paradox is the study of the collapse of senescent industry. The seminal papers, Hillman (1982) and Cassing and Hillman (1986), applied the political support function approach to the question of why declining industries continue to decline despite the protection they receive with a special emphasis on their eventual collapse. Subsequent important contributions include Matsuyama (1987), Van Long and Vousden (1991), and Brainard and Verdier (1997). While this branch of the literature is also concerned with sunset sectors, its focus is a quite different in that it takes as a point of departure that declining industries will receive protection; our paper seeks to understand why this is so.[4]

The main idea in our model is based on an unpublished manuscript by one of the authors, Baldwin (1993), but our paper differs significantly in its modelling strategy and the rigour of the analysis. Baldwin (1993) relied on unanticipated, but permanent changes in the degree of foreign competition to generate differences between winners and losers and did not explicitly allow for the simultaneous existence of both types. This paper generalizes Baldwin (1993) using a model in which different industries face idiosyncratic, temporary demand shocks, agents are forward looking and policy setting is intertemporal. We also note that Grossman and Helpman (1996) extended the basic asymmetric lobbying framework of Baldwin (1993) by considering free riding by new entrants in 'winning' sectors. Their main argument is that it is free riding rather than entry, which causes the asymmetry; we re-visit this issue below.

We note that the sunk-cost based solution we propose in this paper is complementary to all the abovementioned solutions.

Empirical studies of the losers' paradox

The lobbying success of losers – the losers' paradox – has been extensively documented empirically. In the US, Hufbauer and Rosen (1986), Hufbauer, Berliner and Elliot (1986), and Ray (1991) have documented that declining industries receive a disproportionate share of protection. Particularly successful are agriculture, textiles, footwear, clothing and steel, all of which have experienced secular declines in employment and GDP shares in the US. For instance, in their introduction Hufbauer and Rosen (1986) write:

"With bipartisan regularity, American presidents since Franklin D. Roosevelt have proclaimed the virtues of free trade. They have inaugurated bold international programs to reduce tariff and non-tariff barriers. But almost in the same breath, most presidents have advocated or accepted special measure to protect problem industries. ... The United States is not the only country to have experienced competition in mature industry from foreign goods. Most industrial countries, in Europe, Japan and elsewhere, have encountered similar difficulties. "

More directly, many econometric studies have found that being a 'loser' in terms of employment, output or import competition helps an industry get more protection. Baldwin (1985) and Baldwin and Steagall (1994) find a strong correlation between positive "serious injury" findings of the US International Trade Commission and reduced industry profits and employment. Glismann and Weiss (1980) find that above-trend income increases are correlated in reductions in protection in Germany between 1880 and 1978. Marvel and Ray (1983) find that an industry's growth rate has a negative impact on its level of protection. This is confirmed by Baldwin (1985)'s finding that industries which were most successful in resisting tariff cuts in the Tokyo Round were characterised by, *inter alia*, relatively slow or negative employment growth as well as by high and rising import penetration ratios. More recently, econometric evidence from Ray (1991) shows that declining industries tend to get more protection, and Trefler (1993) finds that an increase in import penetration tends to

[4] Many of these papers conjecture as to why declining, as opposed to expanding, industries so frequently garner government support, but this is not their main focus. In particular, Brainard and Verdier (1997) suppose that credit constraints prevent an expanding sector from investing in the lobbying it needs to get protection. Also, Hillman (1989) discusses the asymmetrical effects of entry, but does not incorporate it into his formal model.

increase the level of protection a sector is afforded.[5] Furthermore, a number of econometric studies have found that average tariff levels tend to rise in recessions, for example Ray (1987), Hansen (1990), O'Halloran (1994); Gallarotti (1985) finds the same for 19th and 20th century tariffs in the US. In a similar light, the time-series approach of Bohara and Kaempfer (1991) show that tariffs are Granger-caused (positively) by unemployment and real GNP.

We also note that the systematic favouring of losers is actually inscribed in international and national trade laws. GATT generally prohibits countries from pursuing policies that favour domestic firms over foreign firms. The major exceptions to this principal (safeguards, dumping duties and countervailing duties) involve situations where imports cause or threaten to cause material injury to an established industry. In contrast, there are no general exceptions that allow a country to promote the interests of an expanding industry. These principles can also be found in national laws. For example, US trade laws make 'decline', appropriately interpreted, an explicitly requirement for trade protection.

If one accepts the view that political economy forces shape national and international trade laws, the abovementioned asymmetry is puzzling. Lobbying dollars of expanding industries should be just as welcomed by politician as the dollars of declining industries. Therefore it is odd that politicians should have adopted laws that greatly restrict their ability to promote profits in expanding sectors, while at the same time creating loopholes that allow them to boost the profits of declining industries.

Plan of the paper

The paper is structured as follows. The next section develops the static economic and political-economic model. Section 3 introduces the dynamic structure of the model and solves the game allowing for entry. Section 4 considers extensions and Section 5 concludes.

2. The basic model

Formalization of the asymmetric lobbying effects discussed in the introduction requires a model that first shows how industry support affects the fortunes of firms that may lobby and then connects these changing fortunes to the political decision-making process. To this end we present a very simple model of the economy whose special features simplify the algebra; we shall argue, however, that the basic results in the paper do not qualitatively depend upon these special features. In particular, we combine a standard monopolistic competition model with the lobbying model of Grossman and Helpman (1994).[6]

2.1. Tastes and technology

Consider an economy with M+1 sectors. The 'plus one' sector, produces a homogenous good, A, under constant returns and perfect competition using labour L. By choice of units, one unit of L produces one unit of A. There is also a large number, M, of symmetric industrial sectors that are marked by increasing returns and monopolistic competition. A typical industrial firm faces variable costs equal to âwx were x is firm output, â is the unit labour requirement, and w is the wage. In this section, we take the number of firms as given to fix ideas, delaying consideration of entry to section 3.

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[5] Interestingly, Gawande and Bandyopadhyay (2000), who explicitly test the Grossman-Helpman framework using cross-industry data on US non-tariff barriers coverage rations and US lobbying spending, find a negative relationship between import penetration and the level of protection when the sector is not organised; this relationship is positive otherwise.
[6] Typically, the new political economy literature works with a Ricardo-Viner model.

Instantaneous utility is linear in the consumption of A and a two-tier index of industrial-goods consumption:

(1) $$U = A + \sum_{m=1}^{M} \alpha_m \ln D_m; \quad D_m^{1-1/\sigma} \equiv N_m^{-\chi/\sigma} \int_0^{N_m} c(j)^{1-1/\sigma}\, dj; \quad \sigma > 1$$

Here D_m is the CES consumption index for typical industrial sector m, c_{mj} is consumption of variety j in sector m, N_m is the number (mass) of such symmetric varieties within a typical sector, σ is the constant elasticity of substitution among varieties, and α_m is a demand-shift parameter. M is fixed.

Note that inclusion of the parameter χ makes the CES aggregate D_m more general than the usual functional form. The parameter χ measures the preference for diversity and in the standard love-for-variety preferences, χ is taken to be zero implying that consumers could become unboundedly happy by consuming an infinitely small amount of infinitely many varieties. To avoid this feature, and to simplify our algebraic expressions, we neutralise the love-of-variety aspect by taking χ=1.

Importantly, we assume random preferences in the sense that α_m is either α_H or α_L where $\alpha_H>\alpha_L$, i.e. each sector faces either high or low demand.[7]

The model features a continuum of consumers endowed with a share – equal to s(i) for consumer i – of the economy's labour and of all firms' equity, so the individual budget constraint is:

(2) $$s(i)(wL + \sum_{m=1}^{M} \Pi_m - T) = p_A A_i + \sum_{m=1}^{M} \int_{j=0}^{N_m} \tau_m p_{mj} c_{mj} dj$$

where Π_m is operating profit from all sector-m firms, L is the economy-wide labour endowment, T is the total lump-sum tax collected, ô is an *ad valorem* tax or subsidy factor (i.e. the rate is τ-1, with this being a tax if positive, or subsidy if negative). Producer prices are denoted as 'p' so consumer prices are 'ôp' (τ is fully passed on to consumers under Dixit-Stiglitz monopolistic competition).

We normalise the economy's total labour endowment to unity,[8] so optimal aggregate demand for a typical variety j in a typical sector m, and the aggregate demand for A are:

(3) $$c_{mj} = \frac{\alpha_m (\tau_m p_{mj})^{-\sigma}}{\int_{j=0}^{N_m} (\tau_m p_{mj})^{1-\sigma} dj}; \quad A = (w + \sum_{m=1}^{M} \Pi_m - T - \sum_{m=1}^{M} \int_{j=0}^{N_m} \tau_m p_{mj} c_{mj} dj) / p_A$$

As usual, the producer price, p_{mj}, for typical industrial firm j is related to marginal costs according to $p_{mj}(1-1/\sigma)$=âw. By choice of units (viz. β=1-1/σ) and taking L as numeraire, we can – without loss of generality – set p_{mj}=1 for all firms in all M sectors. Consequently, a typical firm's flow of operating profit is[9]:

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[7] Our qualitative results would hold if we assumed technology shocks rather than demand shock (more on this in Section 4.2).

[8] Accordingly, we assume that Óá$_m$ is small enough so that production of A is always positive at equilibrium.

[9] Rearranging the firm's first order condition to $(p_{mi}-\beta w)c_{mi} = p_{mi}c_{mi}/\sigma$ and using the demand function and symmetry of varieties yields the result.

(4) $$p_m = \frac{a_m}{s\,t_m N_m};\ a_m \in \{a_L, a_H\},\ \Pi_m \equiv N_m p_m$$

where within-sector symmetry allows us to drop the firm subscript. Using the *ex ante* symmetry of sectors, it proves convenient to index sectors by the state of demand faced, denoting the Π earned by those facing high and low demand as Π_H and Π_L, respectively; plainly $\Pi_H > \Pi_L$ for any given level of $\hat{o}_m$.

2.2. Utilitarian benchmark

In the sequel, we introduce a political process governing the choice of τ, but intuition is served by first identifying the socially optimal τ. Specifically, the government chooses sector-specific taxes ($\hat{o}>1$) or subsidies ($\hat{o}<1$) to maximise aggregate welfare measured by a parameter 'a' times the sum of consumers' utility.[10] The A-sector is untaxed and the lump-sum tax T is adjusted to maintain a balanced budget. By symmetry of firms, the lump-sum tax revenue (which may be negative) required to implement the vector τ is just the sum over all m of $(1-\hat{o}_m)N_m c_m$. Using (4), together with the solutions for T, p and c_m, in (1) we find that the Benethamite objective is:

(5) $$W \equiv a(1 + \sum_{m=1}^{M} a_m \left(\ln(\frac{a_m}{t_m}) - \frac{1-1/s}{t_m} \right))$$

where we have chosen units of A to normalise p_A to unity.[11]

Maximising this with respect to $\hat{o}_m$ (all m) requires the government to offset the only distortion in the economy, namely the monopolistic pricing distortion, and this implies that the optimal utilitarian policy is:

(6) $$t_m \;=\; b \;\equiv\; (1-1/s)\,.$$

for all M sectors. This clearly entails a subsidy (τ<1 is a subsidy while τ>1 is a tax) to all industrial sectors since σ>1. Note also that since there is only one distortion and lump-sum taxation is possible, the Benthamite government can attain the first best. With this utilitarian benchmark in hand, we turn to the lobbying game, where the policymaker may be influenced by political contributions.

2.3. Lobbying

Hillman (1989) and Baldwin (1985) point out that under realistic assumptions, elected officials may not be fully aware of the economic interests of their constituents. And their constituents may not be familiar with all the policies (and their economic consequences) championed by their elected representatives. Consequently, Baldwin (1985) notes, a group of voters "may have to engage in time-consuming and costly lobbying activities to bring its viewpoint to the attention of legislators. Similarly office-seekers need funds to inform the voters of how they have served them or will do so in the future." The so-called pressure group model, or lobbying model, developed by Olson (1965) and others, focuses on the costs and benefits of lobbying and its impact on policy. This class of models abstracts from electoral politics, assuming that the government is entrenched or at least that every elected government will react in the same way to lobbying. See Grossman and Helpman (2001) for formal modelling of these ideas.

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[10] We introduce, 'a' – without loss of generality – to facilitate the algebra in the sequel.
[11] See the appendix for details of the calculation.

Explicit consideration of such imperfections would require a model that is very much more complicated than we need to examine the basic logic of asymmetric lobbying. Thus, following standard practice (see, for example the political support function approach of Hillman, 1989, and the formal lobbying approach of Findlay and Wellisz, 1982) we skip the micro modelling of how lobbying funds influence policy choices. Rather we follow the approach in Grossman and Helpman's seminal 1994 paper in which lobbying expenditures, in the form of 'contributions', are just assumed to directly enter the objective function of the government.

Specifically, we model lobbying as a menu auction (Bernheim and Whinston, 1986), and we assume that all industrial sectors are perfectly organised in the Grossman-Helpman sense (i.e. all firms in a sector act as one when it comes to political contributions).[12] Contributions made by sector-m are denoted as C_m. Consumers and the untaxed A-sector are unorganised and thus do not lobby.

Government's objective, lobbies and contributions

As in Grossman and Helpman (1994), the government's objective function Ω is a weighted sum of lobby contributions and aggregate social welfare W:

(7) $$\Omega = W + \sum_{m=1}^{M} G_m I_m C_m ;\ G_m \in \{0,1\}, I_m \in \{0,1\}\ \ \forall m$$

where the first term W=aU is the utilitarian social welfare function from (5), and the second term is total political contributions; the binary variable G_m reflects the fact that the government always has the option of rejecting contributions from any sector and the binary variable I_m reflects the lobbying choice of a sector (I_m=0 implies no lobbying). By way of interpretation, note that a pure Benthamite government would be characterised by a=∞ and a pure 'Leviathan' by a=0, so 'a' captures the extent to which governments care about social welfare as opposed to political contributions. Mitra (1999) adds a lobby-formation stage to the Grossman-Helpman setting. He assumes an exogenous fixed cost of getting organised, assumed to differ across sectors, and study how this affects the equilibrium outcome. By contrast, we assume that the fixed cost of lobbying is zero for all M, but instead endogenise the decision to lobby actively or not. This decision is taken according to an external factor that has nothing to do with an exogenous cost of lobbying *per se*.

The vectors ô and G are the government's choice variables. Lobbies contribute in order to induce the government to deviate from the utilitarian first best. As in the Grossman-Helpman model, we restrict contributions to be globally 'truthful', so if an industrial sector 'm' decides to lobby (i.e. I_m=1), its contribution is C_m(ô)=Π_m(ô)-B_m, where B_m is a scalar; if it decides not to contribute (i.e. I_m=0) then C_m(ô)=0 for all τ.[13] B is the vector of which B_m is a typical element.

The all-lobby outcome

An equilibrium in this world is defined by the government's strategy (i.e. the vectors τ and G), and the M-sectors' strategies (i.e. the vectors I and B). The payoff function of a typical sector 'm' is Π_m-B_m. The government's payoff function can be written as:

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[12] Given that the representative consumer owns some of all firms, there is an issue about lobbying incentives. Grossman and Helpman (1994) deal with these by assuming un-diversified portfolios. To keep our model as streamlined as possible, we just assume that firms are concerned only with their own profit when lobbying.
[13] Locally truthful strategies are the only ones to survive the 'coalition proofness' refinement introduced in Bernheim et al. (1987).

(8) $$\Omega \equiv a(1+\sum_{m=1}^{M} a_m \left(\ln(\frac{a_m}{t_m}) - \frac{b}{t_m} \right) + \sum_{m=1}^{M} I_m G_m (\frac{a_m}{t_m s} - B_m)$$

where we have used (5), (4) and the fact that contributions are truthful.

We shall calculate the B_m's below, but taking them as given for the moment, we investigate what policy would be chosen if a typical sector chooses to make contributions and the government chooses to accept them (i.e. I_m=G_m=1, all m). In this 'politically' influenced case, the typical element of ô that maximises (8), can be shown to be:

(9) $$t_m = b - \frac{I_m}{as}.$$

Three remarks are in order. First, recalling that β≡1-1/σ is the first-best subsidy, the subsidy vector in the lobbying equilibrium equals the utilitarian benchmark only when the government is benevolent (a=∞), or when no group contributes (all I_m's=0). Second, (9) shows that the acceptance of contributions induces the government to subsidize a sector beyond the social-welfare maximising level. This allows the sector to sell more even as it continues to price monopolistically. Third, due to our functional forms, each sector's $ô_m$ depends only on the sector-specific organisation variable and parameters, with the subsidy increasing in the profit margin 1/σ and decreasing in the parameter 'a' that measures the government's concern for social welfare.[14]

Characterisation of the equilibrium is facilitated by the fact that the government's participation constraint is just binding in equilibrium (as usual in the Grossman-Helpman approach). Thus, the B_m's are chosen by lobbies to make the government just indifferent between allowing τ to be influenced by accepting contributions, and choosing its outside option, which is to refuse contributions from a sector and set that sector's subsidy to the utilitarian optimal described in (6). That is, assuming all other sectors are lobbying and contributing, sector-m's contribution, which equals Π_m-B_m, must be large enough to make the government indifferent between accepting its contribution, i.e. choosing G_m=1 (and thus setting τ_m=β-1/aσ) and refusing its contribution, i.e. choosing G_m=0 (and thus setting τ_m=β). In symbols, the equilibrium B_m must satisfy:

(10) $$\Omega^* - \Omega^{dev} \equiv a a_m \left((\ln\frac{a_m}{b-1/as} - \frac{b}{b-1/as}) - (\ln\frac{a_m}{b} - 1) \right) + \Pi_m - B_m = 0$$

where Π_m is evaluated at τ_m=β-1/aσ. Here Ω* is the government's payoff in the all-lobby outcome – viz. (8) evaluated at τ_i=β-1/aσ (all i) with all sectors contributing – and Ω^{dev} is the government's payoff where τ_i=β-1/aσ and G_i=1 (all i but m), G_m=0, and τ_m=β.

The Nash equilibrium

To show that the all-lobby outcome is a Nash equilibrium with (9) giving the equilibrium τ's, we show that a typical sector gains from lobbying even when its contribution is large enough to induce the government to accept its contributions. The informal argument is quite simple. A sector's contribution induces the government to choose a policy that – while sub-optimal from the utilitarian perspective – transfers money from consumers to firms. To respect the participation constraint, a sector's net contribution need only compensate the government for the reduction in social welfare (i.e. the reduction in the W part of Ω). Because the social welfare loss is second-order while the transfer is first-order, all sectors will indeed find it in their interests to contribute. Finally the government is, by

[14] This is due to the additively separable preferences; generally, all parameters would be relevant.

construction, just indifferent to deviating from the equilibrium, so its strategy of accepting contributions is Nash. Note that since the inequality is independent of the state of demand, we see that both high and low demand sectors would lobby. To summarise this intermediate result, we write:

> **Result 1:** When entry is impossible, the outcome where all sectors lobby regardless of the state of demand is a Nash equilibrium. In this all-lobby outcome, the levels of subsidies are given by (9). Moreover, the outcome where lobbying is done only by sectors facing low demand is not a Nash equilibrium.

The proof of this result boils down to the proof of a simple proposition. By construction, the equilibrium B's are set to induce the government to accept all contributions, so all we need to show is that a typical sector will want to lobby. To this end, two facts are useful: τ_m equals β-1/aσ if sector 'm' lobbies and β otherwise, and operating profit is decreasing in τ_m (i.e. increasing in the subsidy rate 1-τ_m). Given these facts, a sector can gain from lobbying provided only that the contribution it must pay to the government is sufficiently low. Specifically, denoting the sector-m operating profit function as $\Pi_m[\cdot]$, the net profit from lobbying must exceed the net profit from not lobbying, i.e. $\Pi_m[\beta-1/a\sigma]-C_m > \Pi_m[\beta]$. Given that contributions are truthful, the task is to show that $B_m > \Pi_m[\beta]$.

The Nash-equilibrium B_m is determined by (10), which – using (4) and (9) – can be written as:

$$\textbf{(11)} \qquad B_m = aa_m \left((\ln(\frac{a_m}{t\,*}) - \frac{b}{t\,*}) - (\ln(\frac{a_m}{b}) - 1) \right) + \frac{a_m/s}{t\,*}; \quad t* = b - 1/as$$

Since (4) implies that $\Pi_m[\beta]=\alpha_m/\sigma\beta$, lobbying is worthwhile to sectors, if the following inequality holds:

$$\textbf{(12)} \qquad \Delta \equiv a_m \left(a(\ln\frac{1}{t*} - \ln\frac{1}{b}) - ab(\frac{1}{t*} - \frac{1}{b}) + \frac{1}{s}(\frac{1}{t*} - \frac{1}{b}) \right) > 0$$

Observe that the equality either holds for sectors facing both low and high states of demand, or it holds for neither.

By concavity of the log function, $\ln(1/\tau^*)$- $\ln(1/\beta)$ exceeds $\tau^*(1/\tau^*- 1/\beta)$. Substituting this in (12) and rearranging, we see that the inequality is greater than something that equals zero, i.e.:

$$\Delta > (at* - ab + \frac{1}{s})(\frac{1}{t*} - \frac{1}{b}) = 0$$

The right-hand side equals zero since $a(\tau^*-\beta)=-1/\sigma$, given (9).

Finally, note that this reasoning shows that any equilibrium in which some sector was not lobbying would not be a Nash equilibrium since each sector would unilaterally gain from lobbying. QED.

3. Entry and the incentive to lobby

We now extend the model to continuous time and allow the number of firms in a typical sector to be determined via free entry.

3.1. Additional assumptions

The representative agent maximises her lifetime utility, assumed to be additively separable and equal to $\int_{t=0}^{\infty} e^{-rt}Udt$, where U is as in (1) and r>0 is the discount rate. The representative agent can chose to consume her income or to invest it in shares of new firms. Preferences are random with the switching between α_L and α_H being governed a Markov process.

Creation of a new industrial firm in any of the M sectors entails a fixed cost consisting of one unit of capital. One unit of capital is produced from F units of labour under conditions of perfect competition, so the entry cost equals F. Importantly, this capital is *sunk* in the sense that once a unit of capital is built it must be employed by an industrial sector or abandoned (since all consumers are identical, no firms will be sold in equilibrium), also it does not depreciate.[15] This cost is meant to reflect market-entry costs as in the model of Baldwin (1988). Any industry in state $\alpha \in \{\alpha_L, \alpha_H\}$ at date t remains in the same state α at date t+dt with probability 1-λdt. That is, shocks arrive at a Poisson rate of λ. We therefore have the Markov transition matrix depicted in Table 1.

Table 1: The Markov transition matrix

Transition probabilities	α_L	α_H
α_L	1-λdt	λdt
α_H	λdt	1-λdt

The next task is to characterise the entry decision.

3.2. Entry

Entry, as usual, is assumed to occur instantaneously and up to the point where the equilibrium value of firms is no greater than the entry cost, F. Due to the stochastic demand, a single firm will have different values when it is facing high versus low demand.

Value of the firms at steady-state

The value of a typical firm in a typical sector, denoted as V, is the discounted valued of operating profits less any lobbying contribution.[16] By symmetry, there are only two levels of V at steady state, one for firms in low-demand sectors, V_L, and one for firms in high-demand sectors, V_H. Specifically:

$$(13)\qquad \begin{aligned} V_L &= b_L dt + e^{-rdt}\left[\, l\, dtV_H + (1 - l\, dt)V_L \right]; \qquad b_L = (\Pi_L - I_L C_L)/N \\ V_H &= b_H dt + e^{-rdt}\left[\, l\, dtV_L + (1 - l\, dt)V_H \right]; \qquad b_H = (\Pi_H - I_H C_H)/N \end{aligned}$$

where we omit the time and sector subscripts since these values are constant at steady state and sectors face either high or low demand; note that the b's (a mnemonic for benefit) are the per-firm operating profit net of any contributions, so $b_i = B_i/N$ (i=H,L).

These equations are easy to interpret. The value of a firm in state L at time t is equal to the current flow of net profit plus the discounted expected value it will have at time t+dt. With some probability λdt it will transit to state H; with probability 1-λdt it will remain in

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[15] Adding depreciation is uncomplicated (see section 4.3) but is not necessary here.

[16] As a special feature of our functional forms, total operating profit per sector is independent of the number of firms per sector, but the key point is that V is diminishing in N.

state L. V_H is defined analogously. In the limit of continuous time, dt→0, by symmetry among industries and firms within industries, and rearranging, we get:

(14)
$$rV_L = b_L + l(V_H - V_L), \qquad rV_H = b_H - l(V_H - V_L)$$
$$\Leftrightarrow$$
$$V_L = \frac{(r+l)b_L + l\,b_H}{r(r+2l)}, \quad V_H = \frac{(r+l)b_H + l\,b_L}{r(r+2l)}$$

The top two expressions are standard asset-pricing equations, i.e. 'r' times the expected value of the firm must equal the sum of the current flow of net profit and the expected capital gain. The bottom two expressions are the solution for the V's in terms of the b's.

As the cost of entry is F, free-entry requires that the steady state number of firms per sector rises until the maximum value of a typical firm equals F. A firm's value may differ between high and low demand states, so the entry condition is:

(15)
$$N \quad s.t. \quad \max\{V_H, V_L\} = F$$

Note that U in (1) is quasi-linear, so the transition dynamics are degenerate, i.e. N_m immediately jumps to its steady-state value N* as soon as $á_m$=$á_H$. (It jumps to some N_0<N if $á_m$=$á_L$ initially. See below.)

3.3. The only-losers-lobby equilibrium

We assert that the outcome in which only sectors facing low demand lobby is a Markov perfect equilibrium (MPE), and refer to it as the "only losers lobby" outcome. In this dynamic version of the model, the state variables are the number of firms in a typical sector, N, which is influenced by players' actions via free entry, and the vector of the states of demand facing each sector. Given our simple set up, a sector's strategy can be summarised by its decision to lobby or not, with this action possibility depending upon the state of demand. Formally, the only-losers-lobby equilibrium can be expressed as the set of sector strategies such that:

(16)
$$I_m = \begin{cases} 0, & if \quad a_m = a_H \\ 1, & if \quad a_m = a_L \end{cases}$$

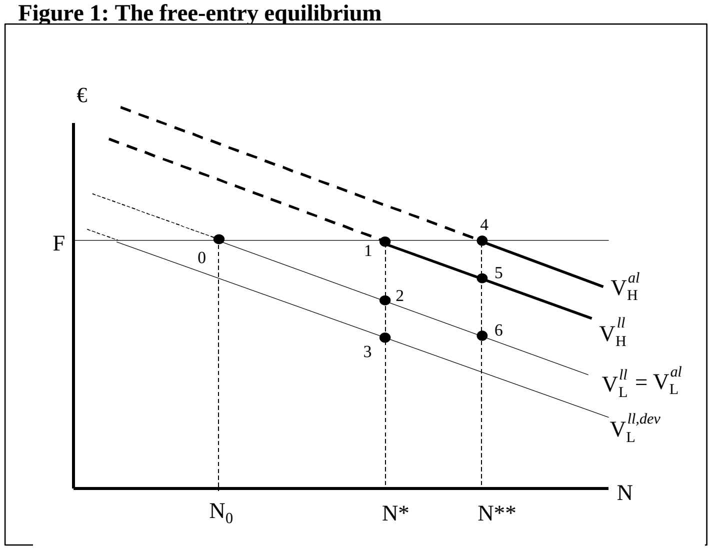
where I_m=1 and I_m=0 indicate, respectively, that sector m is, or is not lobbying. Note that due to irreversible entry and the fact that Dixit-Stiglitz monopolistic competition never produces negative operating profit, the number of firms active in each sector is constant in steady state. This and symmetry of firms allows us to drop the sector subscript from the N's. In this outcome, the values of a typical firm are:

(17)
$$V_L^{ll} = \frac{b_L(r+l) + l\,b_H}{r(r+2l)}, \; V_H^{ll} = \frac{b_H(r+l) + l\,b_L}{r(r+2l)}; \; b_H = \frac{a_H}{s\,b\,N}, b_L = \left(\frac{a_L}{s\,(b-1/as)} - B\right)\frac{1}{N}$$

where the superscripts '*ll*' signify the value of firms implementing (only) losers lobby strategies.

To demonstrate that the only-losers-lobby outcome is an MPE, it is useful to establish that for any given N, the value of a firm when it faces low demand is no greater than its value when it faces high demand, i.e. $V_L^{ll} \leq V_H^{ll}$=F. This feature is intuitively obvious and easy to establish formally.[17] Figure 1 helps interpret the equilibrium by plotting values of a typical firm against the number of firms per sector. Since competition lowers per-firm value, all lines slope downwards. The second and third lines indicate the only-losers-lobby outcome for sectors facing high and low demand. These are marked V_H^{ll} and V_L^{ll} respectively; the V_H^{ll} line is above the V_L^{ll} line. Due to free entry, the value of a firm can never rise above F, so all the value lines are cut off at the horizontal line, F. Plainly, the steady state number of firms is N* in the only-losers-lobby outcome. The value of firms facing high demand will be F; point 2 gives the value of firms facing low demand.

Figure 1: The free-entry equilibrium



Establishing the Markov perfect equilibrium

Using the diagram, we can show that the only-losers-lobby outcome is a Markov perfect equilibrium (MPE). We start with the government. At every time t, the government cannot, by construction of the B's, gain from deviating from the only-losers-lobby outcome. Thus, accepting contributions and providing the politically influenced τ is Nash in every subgame and state of the world. The argument for high-demand sectors is similar. No high-demand sector could gain from deviating; after all, free entry ensures that the value of a typical firm cannot rise above F, so any lobbying effort would be useless. Thus, the strategy of no lobbying in high demand-states is Nash in every subgame.

Finally, low-demand sectors cannot gain from deviation since ceasing to lobby would lower their value from point 2 to point 3 in the diagram. More specifically, under this deviation, the value of a typical firm facing low-demand sector would be $(\lambda b_H+(r+\lambda)b_L^{dev})/r(r+2\lambda)$, where b_L^{dev} is the per-firm operating profit in the low-demand state when the subsidy is the socially optimal β, namely $b_L^{dev}=\alpha_L/\sigma\beta N$. From the proof of Result 1,

[17] The proof is by contradiction. If $V^{ll}_L>V^{ll}_H$, then the free entry condition implies F= V^{ll}_L, so F> V^{ll}_H. This in turn implies that the high-demand sector could lobby without attracting entry and so by Result 1 it would. Since this contradicts the definition of the only-losers-lobby outcome, we know $V^{ll}_L\leq V^{ll}_H$ =F.

we saw that one-period lobbying is always worthwhile when it does not change N, so we know that $b_L=[-B+\alpha_L/\sigma(\beta-1/a\sigma)]/N$ exceeds b_L^{dev}. From (14) this tells us that not lobbying in the low-demand state would lower the typical firm's value.

We summarise these findings in:

Result 2: Since free entry makes lobbying useless for sectors facing their entry margin (i.e. high-demand sectors), the only-losers-lobby outcome is a Markov perfect equilibrium. By contrast, sectors facing low demand find their values below entry costs, so lobbying can raise their value.

As it turns out, the only-losers-lobby outcome is not the only MPE, as Grossman and Helpman (1996) have pointed out.

3.4. Other equilibria

Note that starting from N=N*, lobbying in the high state does no good – but neither does it do any harm to firms facing high demand. If – for whatever reason – incumbents in a sector with high demand actually did lobby, the results would be an increase in the number of firms to N** in the diagram. Importantly, once the new entrants are irreversibly in the market, a deviation by cessation of lobbying in the high-demand state would lower the value of the firm from point 4 to 5 in the diagram, so no deviation would occur in the high-demand state. Likewise, no deviation would occur in the low-demand state, so this outcome – what we call the 'all lobby' outcome, denoted as '*al*' in the diagram – is also an MPE. We summarise this in:

Result 3: When entry is free, the all-lobby outcome is a Markov perfect equilibrium since once high-demand lobbying has increased the number of active firms, cessation of lobbying would lower the value of such firms. As before, sectors facing low demand can raise their value by lobbying, so lobbying in both states is also a MPE.

It is possible to arrive at the N=N** state since lobbying in the high-demand state starting from N=N* is both useless and costless in terms of incumbents' value in the high-demand state.

Dominance of only-losers-lobby MPE

Although this second MPE does exist, there are good reasons for believing that it would never occur. The basic argument is that although the increase in the number of firms from N* to N** does not affect V_H, it will lower the value of the firm once low-demand returns. Note that the value of a typical firm facing high demand is identical in the two MPEs (namely F), but the value of a typical firm facing low-demand is lower in the all-lobby outcome. To see this, observe that from (14) with V_H=F, we have that V_L^i equals $(b_L^i+\lambda F)/(r+\lambda)$, where i equals '*ll*' (in the only-losers-lobby equilibrium) or '*al*' (in the all-lobby equilibrium). Because b_L is given by (16) with $\alpha_m=\alpha_L$ and N**>N*, it is clear that V_L^{al} is less than V_L^{ll} (these values correspond to points 2 and 6 in the diagram). In short, although the lobbying-induced entry has no effect on the value of firms facing high-demand, the presence of more firms <u>lowers</u> the value of the same firms in the low-demand state. To summarise this we write:

Result 4: While both the only-losers-lobby and all-lobby outcomes are MPEs, the only-losers-lobby MPE dominates the all-lobby MPE in the sense that firms are indifferent between the two when facing high-demand, but strictly prefer the only-losers-lobby equilibrium when facing the low-demand state. This makes the only-losers-lobby MPE focal.

4. Extensions

We consider three extensions of our analysis in this section. We first allow for the possibility that new entrants free ride on the lobbying contributions by former incumbents for some time. We also show that assuming technological shocks yields the same qualitative results as in the case of demand shocks described thus far. Finally, we apply our model to sunset industries – namely, for the case of *permanent* adverse shocks.

4.1. Free riding

In the spirit of the Grossman-Helpman lobbying approach, our basic model assumes that all firms in a sector are perfectly organised politically in the sense that they act as one when it comes to presenting and financing a contribution menu to the government. To deal with entry, the basic model extended this assumption to allow for entry in the simplest possible way, namely by supposing that all entrants immediately act as incumbents. This of course this is not the only reasonable assumption (see Grossman and Helpman 1996 for discussion of the issue) and, as we shall see, relaxing it has important implications for Result 3. We shall show, however, that it does not alter (and even reinforces) our main result, i.e. that free entry removes the incentive for lobbying in sectors facing their entry margin since above normal profits are immediately and successfully grabbed by entrants.

Modelling free riding

To model free riding by entrants, we assume that new firms do not share the financing of contributions initially, but they do become perfectly organised (i.e. act identically to incumbents) eventually. Specifically, all newly entered firms start as free riders but switch to non-free riders (i.e. become join the perfectly organised firms) according to a Poisson process marked by a hazard rate of ϕ. This switch is synchronised across all entrants in the sense that at any given moment all new entrants will either all be free riders, or will all be non-free riders. Furthermore, we assume that the switch to non-free rider status is permanent, so that eventually all firms are perfectly organised. Note that ϕ provides a natural parameter for the extent of the free-riding problem since newcomers are expected to remain free riders for a period equal to $1/\phi$. Our basic model implicitly assumes that ϕ is infinite.

We begin by studying the all-lobby outcome, i.e. where both high- and low-demand sectors lobby. Free riding complicates calculation of the expected value of entering since we must take account of the probability that: (i) the sector sees its demand change, and that (ii) the entrant experiences a shift in its free-riding status. Incumbent firms in this case will have one of four possible values, namely $V_{H,u}$, $V_{L,u}$, V_H or V_L; these are, respectively, the value of an incumbent facing high or low demand when entrants are unorganised (as shown by the subscript ‘u’), and when the entrants have joined the lobby (as shown by a lack of a subscript). Three instantaneous probabilities are relevant to an incumbent’s value. These are: (i) the probability that the sector experiences a shift in demand but entrants remain free riders, viz. $\lambda(1-\phi)$, (ii) the probability that the sector experiences a demand shift and entrants become non-free riders, viz. $\lambda\phi$, and (iii) the probability that the sector experiences no change in demand but entrants become non-free riders, viz. $(1-\lambda)\phi$. Taking account of these, the expected values of an incumbent in the various states are:

$$\textbf{(18)}\quad \begin{aligned} rV_{H,u} &= b_{H,u} - \lambda[(1-\phi)(V_{H,u}-V_{L,u}) + \phi(V_{H,u}-V_L)] - (1-\lambda)\phi(V_{H,u}-V_H) \\ rV_{L,u} &= b_{L,u} - \lambda[(1-\phi)(V_{L,u}-V_{H,u}) + \phi(V_{L,u}-V_H)] - (1-\lambda)\phi(V_{L,u}-V_L) \\ rV_H &= b_H - \lambda(V_H - V_L) \\ rV_L &= b_L - \lambda(V_L - V_H) \end{aligned}$$

where the b's are the flow rewards to incumbents in the various states.

The related value equations for entrants are:

$$\textbf{(19)}\quad \begin{aligned} rJ_H &= \pi_H - \lambda\left((1-\phi)(J_H-J_L) + \phi(J_H-V_L)\right) - (1-\lambda)\phi(J_H-V_H) \\ rJ_L &= \pi_L - \lambda\left((1-\phi)(J_L-J_H) + \phi(J_L-V_H)\right) - (1-\lambda)\phi(J_L-V_L) \end{aligned}$$

where J_H and J_L are the values of free-riding firms when the sector is facing high and low demand respectively.

Since free riders do not contribute to lobbying expenses, the flow benefit of being a free rider in both the high and low states of demand exceeds the flow benefit of being an incumbent, i.e.:

$$\textbf{(20)}\quad \pi_H - b_{H,u} \equiv \gamma_H \geq 0, \quad \pi_L - b_{L,u} \equiv \gamma_L \geq 0$$

where the γ's are constants.

The free entry condition in this extension is J_H=F.

Would high-demand incumbents lobby?

In the basic model, when N=N* incumbents in the high-demand sector were indifferent to lobbying since although lobbying won them no benefits, neither did it harm their value. Now we turn to evaluating whether high-demand sectors would still be indifferent to lobbying.

Section 3 established that the value of high-demand incumbents in the only-losers-lobby outcome was equal to F. To see whether high-demand sectors would be indifferent to lobbying we check whether the value of incumbents at the moment they lobby – i.e. at the instant of entry when entrants are still free riders, namely $V_{H,u}$ from (18) – is less than F. To this end we solve (18) and (19) for the values of incumbents in the four possible states of the world (high or low demand and entrants free riding or not). The solutions are somewhat involved but we need consider only the difference J_H-$V_{H,u}$, which can be written as[18]:

$$\textbf{(21)}\quad J_H - V_{H,u} = \frac{(\lambda(1-\phi)+r+\phi)\gamma_H + \lambda(1-\phi)\gamma_L}{(r+\phi)(2\lambda(1-\phi)+r+\phi)}$$

Given (20), we know this is positive for any finite φ. Moreover, this difference limits to zero as φ approaches infinity.

What this reasoning shows is that starting from N=N*, incumbents facing high demand in the only-losers-lobby outcome would never agree to lobby if there were any chance that free entrants would free ride, even for an infinitely short time. This result reinforces our assertion that the only-losers-lobby outcome is focal.[19]

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[18] See the appendix below.

[19] The idea here is akin to the trembling hand refinement. If incumbents did make a mistake and lobby in the high state, thus raising the number of firms up to the point where J_H=F, they would continue to lobby since doing otherwise would lower their value even further. This result, however, relies on the lack of exit. If firms did exit, a one-time mistake would be corrected eventually. We thank Thierry Verdier for this point.

4.2. Technology shocks instead of demand shocks

The basic model assumes stochastic preferences in order to generate stochastic demand functions. In this section, we show that nothing would be changed by assuming stochastic technology instead. To this end, we assume that the sector-specific marginal costs are random variables, β_m, that are independently and identically distributed across sectors. Specifically, $\beta_m \in \{(1-1/\sigma)\beta_G, (1-1/\sigma)\beta_B\}$ for all m, where $\beta_G<\beta_B$; 'G' is a mnemonic for good and 'B' for bad. Under Dixit-Stiglitz monopolistic competition and within-sector symmetry, the price charged by all sector-m firms is $\beta_m/(1-1/\sigma)$.

Moreover, we introduce some substitutability across sectors by assuming that preferences are: $U = A + (\sum_{m=1}^{M} D_m^{1-1/q})^{1/(1-1/q)}$; $q > 1$ Given the law of large numbers, total expenditure on sector-m's varieties is:

(22)
$$Np_m c_m = \frac{(t_m b_m)^{1-s}}{(M/2)(t_G b_G^{\ 1-s} + t_B b_B^{\ 1-s})}$$

Now re-defining α_H and α_L as equal to the right-hand side of expression (22) evaluated at β_m equal to $(1-1/\sigma)\beta_G$ and $(1-1/\sigma)\beta_B$, respectively, we note that $\alpha_H > \alpha_L$ and all other derivations in the paper carry through unaltered.

4.3. Sunset industries

As we said in the introduction, the literature on sunset industries insists on the fact these industries continue to decline despite the protection they receive, assuming they get protection in the first place. A simple extension of our model captures this idea; note that our model allows for endogenous lobbying decisions, so that we do not assume that these industries are protected *a-priori*.

We first assume that firms are 'dying' at a Poisson rate ä, so that N can decrease as well as increase. Next, we still assume that the shocks occurs on demand for simplicity. But now we assume that once a negative shock has hit industry m ($á_m$=$á_L$), demand will not recover. In other words, shocks are *permanent* and the cells of the first row of Table 1 now contain the numbers 1 and 0, respectively. Together, these modifications imply that Eq. (14) has to be replaced by:

(23)
$$(r+d)V_L = b_L, \qquad (r+d)V_H = b_H - l(V_H - V_L)$$
$$\Leftrightarrow$$
$$V_L = \frac{b_L}{r+d}, \quad V_H = \frac{b_L}{r+d} + \frac{b_H - b_L}{r+d+l}$$

where $V_H>V_L$ holds without ambiguity whenever $b_H>b_L$, as before.

Free-entry (15) implies V_H=F, which once again pins down the equilibrium number of firms. We call it N* so that Figure 1 illustrates the present extension as well. In particular, we concentrate on the MPE in which losers only lobby. Note that dying firms are immediately replaced by new entrants so that N=N* as long as á=$á_H$.

Consider now what happens when, at some random time T, demands falls permanently to $á_L$. At time T, the number of firms N*implies that the value of each firm in the hit sector falls to V_L^{ll}<F. In words, despite their lobbying, firms in this sector have values below the opportunity cost of capital, so no firms enter the sector. What is new is that the mass of firms is now decaying at a rate ä, so that V_L^{ll} increases over time (remember that

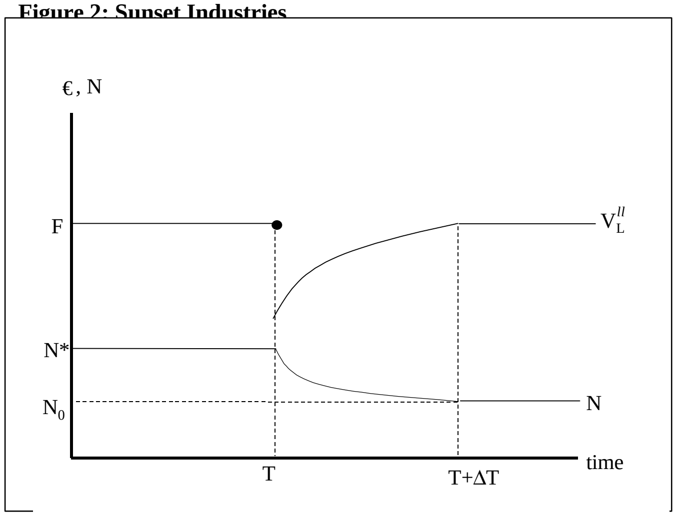
$b_L=B_L/N$ and that B_L is constant). This suggests that N and V_L^{ll} evolve over time as plotted in Figure 2 below.

Figure 2 plots the number of firms and the value of a typical firm in the sector hit by the shock at time T against time. Two comments are in order. First, V_L^{ll} 'overshoots' at time T. Second, as the number of firms shrinks over time, V_L^{ll} goes back to its steady-state value. At time T+ÄT, V_L^{ll} =F holds again and the number of firms no longer changes: $N=N_0$.

To capture more fully the idea that the industry is 'sunset industry', assume now that á keeps falling over time at random intervals without ever reaching 0. Namely, the á's now form an infinite sequence $á_1 \equiv á_H > á_2 >$ … $á_J > á_{J+1} >$…>0 and the Markov square matrix has now an infinitely countable number of rows and column, with identical terms 1-ëdt along the main diagonal, ëdt on the diagonal on the left of the previous one, and zeroes everywhere else. Then N_0, the steady-state mass of firms for $á < á_H$, keeps falling. Note however that $N_0>0$ for all á>0.

That 'tomorrow never dies' is not a nice feature of the model, but this is a direct consequence of the fact that Dixit-Stiglitz monopolistic competition never produces negative operating profit. With more reasonable assumptions, there would exist a threshold á, call it $á_0$, at which $N_0(á_0)<0$. In such a case, all firms would have left the sector eventually.

Figure 2: Sunset Industries



5. Conclusion

Despite differences in political institutions and laws, declining industries account for the bulk of protection granted in all industrialized nations. The GATT also asymmetrically favours ailing industries. This asymmetry is curious since selfish governments should be symmetrically interested in the lobbying dollars of expanding and declining industries. Our paper provides a political equilibrium explanation, based on sunk entry costs. We assume that industries spend money on lobbying to obtain profit-boosting protection and note a strong asymmetry between the appropriability of protection in contracting and expanding industries.

In expanding industries, rents attract new entrants that erode the rents. This is not true in ailing industries. Sunk entry costs (product development, training, advertising, etc.) allow protection to raise profits without attracting entry - as long as profits rise to not more than a normal return on sunk capital. Plainly, asymmetric appropriability implies asymmetric lobbying and the result is that losers get most of the protection because losers lobby harder.

Policy implications

The analysis in our paper can also be used to shed light on the social desirability of packaging protectionist policies with anti-entry policies (such as a government monopoly, and production quotas). Such packing is likely to lead to greater levels of protection, because it increases the incentives of all industries to lobbying for protection. Consider, for instance, an industry that is able to organize a cartel that prevents new production and entry. In such cases, where entry is impossible, all sectors, both expanding and contracting, will find that lobbying generates appropriable rents. As result 1 showed, in such a case all sectors will lobby and the overall outcome will be a greater reduction in social welfare than would occur without the entry barriers.

Most OECD countries have laws prohibiting such collusion, however, in certain industries such as medicine, the special interest group itself regulates the flow of new entrants via control over standards. Labour unions could serve a similar role. In the basic model above, labour was paid the going wage and all rent accrued to firm owners. However it is easy to imagine a model where an industry-specific labour union managed to capture some or all of the rents created by protection. In such a model the labour union would benefit from higher tariffs in expanding industries, as long as they could be sure to control the wages of new workers. In fact many countries do, or did, sanction “closed shop” rules that have exactly this effect. Alternatively, the fixed set-up cost can also be interpreted as human-capital investments; under this interpretation, the model would explain why workers with skills specific to ailing industries would lobby.

One obvious policy implication flows directly from this analysis. Protectionist packages that place controls on domestic entry or production is likely to attract greater lobbying efforts and thereby lead to greater deviations from the social optimum. Prohibiting such packaging of policies would lower equilibrium protection rates.

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Appendix

Deriving the government's reduced form objective function, equation (5)

From the industry demand functions, symmetry of varieties within an industry, and p=1 (which itself follows from mark-up pricing and choice of numeraire and units), we have:

$$D_m \equiv \left(N_m^{-1/s} \int_{j=0}^{N_m} (\frac{a_m}{N_m t_m})^{1-1/s} dj \right)^{1/(1-1/s)} = \frac{a_m}{t_m}$$

so, the second term in the utility function reduces to:

$$\sum_{m=1}^{M} a_m \ln D_m = \sum_{m=1}^{M} a_m \ln(\frac{a_m}{t_m})$$

As usual with quasi-linear utility, spending on A^c is a residual, thus the total demand for A, aggregating over all consumers is:

$$A^c = Y - T - \sum_{m=1}^{M} N_m p t_m c_m; \quad T = \sum_{m=1}^{M} N_m p c_m (1 - t_m); \quad Y = 1 + \sum_{m=1}^{M} N_m \frac{a_m}{N_m s t_m}$$

where we have used the balanced budget assumption to define the level of lump sum taxation, T; aggregate consumer income Y equals labour income, namely unity, and all operating profit, which, given (4), equals the second right-hand term in the expression for Y. Combining the elements, and using p=1, we have:

$$A^c = 1 + \frac{1}{s} \sum_{m=1}^{M} N_m \frac{a_m}{N_m t_m} - \sum_{m=1}^{M} N_m c_m \quad = 1 + (\frac{1}{s} - 1) \sum_{m=1}^{M} \frac{a_m}{t_m}$$

where we have used symmetry to get, $c_m = (\alpha/N_m\tau_m)$, and thus the final expression on the right-hand side.

Combining these expressions for A^c and the D_m's yields expression (5) in the text.

To boost intuition and facilitate graphical representation of the model, it is useful to re-write W as:

$$V = 1 + \sum_{m=1}^{M} \Pi_m + \sum_{m=1}^{M} N_m (a_m D_m - p c_m)$$

That is to say, indirect utility of consumers and thus the utilitarian social welfare function, equals 1 plus the sum of operating profit plus that sum of consumer surplus.

Deriving equation (21)

Refer to (18) and (19) and define ÄJ and ÄV_u as J_H-J_L and $V_{H,u}$-$V_{L,u}$, respectively. Then the system given by (18) and (19) and the previous definition can be rewritten so as to solve for J_H-$V_{H,u}$ and J_H-$V_{H,u}$ –namely, for the differences between the payoff of the free-riders and of the contributors in each state– as well as for ÄJ-ÄV_u:

$$\begin{bmatrix} r+f & 0 & l(1-f) \\ 0 & r+f & -l(1-f) \\ -1 & 1 & 1 \end{bmatrix} \begin{bmatrix} J_H - V_{H,u} \\ J_L - V_{L,u} \\ \Delta J - \Delta V_u \end{bmatrix} = \begin{bmatrix} g_H \\ g_L \\ 0 \end{bmatrix}$$

where we have made use of (20). Note also that the term V_H-V_L does not appear in the system above. Using Cramer's rule, it is now easy to derive (21).