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Merger Policy, Entry, and Entrepreneurship

Robin Mason and Helen Weeds

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Robin Mason
University of Southampton and CEPR

Helen Weeds
University of Essex and CEPR

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Abstract

We assess the impact of merger policy on entry and entrepreneurship. Facing uncertainty about its prospects and foreseeing that it may wish to quit should profitability prove poor, a rational entrant considers possible exit routes. Horizontal merger reduces competition subsequently, lowering welfare in the short run, but also provides a valuable exit route. By facilitating exit and thus raising the value of entry, more lenient merger policy may stimulate entry sufficiently that welfare is increased overall. We calculate the optimal merger policy in the form of a low, but positive, profitability threshold below which a merger is permitted despite its adverse impact on post-merger competition. This may be viewed as an extension of the "failing firm defence" to include ailing, low profitability firms as well as imminently failing ones. The implications of strategic firm behaviour for the optimal policy are examined, and merger policy is compared with an entry subsidy.

Keywords: Merger policy, entry, exit, entrepreneurship.

JEL classification: K21, L40, M13, G34.

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1 Introduction

Competition effects are central to merger policy in most major jurisdictions. In the U.S. and the U.K., a merger that results in a "substantial lessening of competition" (SLC) is liable to be prohibited. The new merger test in the European Union—whether the transaction constitutes a "significant impediment to effective competition" (SIEC)—has a similar interpretation. Competition effects are typically assessed in a narrow and relatively static manner, taking account of the immediate and likely future impact in the market(s) in which the merging parties operate. The wider dynamic effects of merger policy on competition are ignored.

This paper argues that merger policy has a broader impact on incentives to enter a market, to start a business, or to undertake sunk investments, affecting competition in the long run. Horizontal merger creates a more concentrated market structure, reducing consumer surplus and incurring deadweight loss. But the possibility of merger at times when profits would otherwise be low increases the expected value of entry. This increases in turn firms' willingness to enter the market, which has a beneficial effect on competition. Thus, merger policy can be used as a tool to encourage *ex ante* entry into an industry, to maximize welfare overall. Optimal merger policy balances the welfare loss from concentration with the welfare gain from entry.

Taking the wider impact into account, the optimal merger policy implies clearance of some mergers that would, on the current view, be found to cause an SLC (or SIEC) and therefore be prohibited. The optimal treatment of such cases is more lenient than existing practice, with merger being permitted at a time when profits are low but nonetheless positive. The proposed policy could be interpreted as an extension of the "failing firm defence" (FFD)—which permits an anti-competitive merger when one party is about to exit the market—to include ailing, as well as imminently failing, firms.[1] But whereas the FFD is interpreted strictly, requiring the

[1]The failing firm defence (FFD) is recognized in many jurisdictions, but the conditions governing its application are strict and it has been successfully used in just a handful of cases, in which firms face the prospect of imminent bankruptcy.

In the U.S., the FFD is explicitly included in the Department of Justice (DoJ) and Federal Trade Commission (FTC) 1992 Horizontal Merger Guidelines. Historically, three cases were important in its establishment and development: *International Shoe*'s acquisition of a financially troubled competitor in 1930; *Citizen Publishing Co.* in 1969, when the Supreme Court rejected a merger with a distressed newspaper company and set out stringent conditions under which the defence would be accepted; and *General Dynamics* in 1974, in which the Supreme Court concluded that the acquisition of a declining coal mining company was acceptable even though it produced a company with a large market share in a concentrated industry.

In the European Union, the formal basis for the FFD is less explicit; yet the Commission's case law has developed the concept of a rescue merger. The merger of *Kali und Salz* and*Mitteldeutsche Kali* in 1993 established the principle of the failing firm defence (Case No. IV/M.308, 1994). The principle was reinforced

target to be on the verge of bankruptcy, the optimal policy takes the form of a low, but positive, profitability threshold below which a merger is to be permitted, despite its negative impact on post-merger competition.

The policy recommendation is based on rational, forward-looking behaviour. An entrepreneur considering market entry, a business start-up, or making a sunk investment takes into account all possible future outcomes, including potential exit (or disinvestment) routes if things turn out worse than expected. Merger is one possible exit route; bankruptcy is another (generally less attractive) option. In this dynamic framework, merger policy affects entry and entrepreneurial activity. The globally-optimal policy maximizes the benefits of competition overall.

As well as advocating a more lenient approach to merger control than the current FFD, our analysis challenges current policy in more subtle ways. Assuming that the entrant is the acquired party (perhaps because the incumbent has some intrinsic advantage), allowing the target to gain a larger share from merger encourages entry.[2] Similarly, a target with a stronger bargaining position, perhaps due to the strength of a parent company, should be treated more, not less, leniently.[3] Finally, more lenient merger policy harms industry profits more than it increases the entrant's profit. A consumerist policy-maker disregards this, and sets a more lenient merger policy to encourage early entry; a policy-maker who considers industry profits sets policy more strictly.

Although our main focus is on the interaction between merger policy and the entry decision, note that similar considerations apply to any *ex ante* decision made by a firm. For example, the decision to build additional capacity, extend an existing product line, initiate a research and development project, or undertake an advertising campaign could be analyzed in a similar fashion. Like market entry, such decisions also enhance competition or generate surplus in

in 2001 when *BASF* was permitted to acquire its chemical industry competitors *Eurodiol* and *Pantochim*, which were both in receivership; but few other rescue mergers have been permitted.

[2]A key obstacle to approval of the joint operating agreement (JOA) between the *Detroit News* and *Detroit Free Press* (U.S., 1988) was the division of profits between the two parties. The initial administrative law judge decided that the equal division proposed in the JOA was unduly generous to the " failing" newspaper, indicating that it was not in fact failing, and hence the FFD provision in the Newspaper Provision Act of 1970 did not apply. This decision was subsequently overturned by the Attorney General, but only after a delay of almost four years. See Kwoka and White (1999) Case 1, for further details.

[3]The Monopolies and Mergers Commission (MMC) prohibited the proposed sale of *ICI*'s loss-making fertilizer division to *Kemira Oy* (U.K., 1990) in view of adverse competition effects, despite recognizing that *ICI* might exit the market in due course. The strength of the parent company was something of an obstacle in this case, as the loss-making division could be supported by the parent for some time and exit was therefore not considered to be an immediate prospect.

other ways, thus benefiting consumers. What matters for dynamic analysis is that the decision involves a sunk cost or is difficult to reverse, and that the returns are uncertain and affected by the prospects of future merger. We have chosen entry as an important example of such a decision; but the analysis can be applied to other business activities.

The literature on (horizontal) mergers generally is very large (see e.g., Jacquemin and Slade (1989) and Motta (2004) for surveys). Until recently, the focus has been on static models in which merger occurs exogenously. For example, see Salant, Switzer, and Reynolds (1983) Deneckere and Davidson (1985), Perry and Porter (1985), Farrell and Shapiro (1990) and Kamien and Zang (1990), amongst others. This literature focuses exclusively on market conditions *after* merger occurs. Merger policy balances the deadweight loss from increased market power after merger against cost (and price) reduction from increased efficiency after merger. In contrast, in this paper, we contrast conditions *after* a merger occurs with conditions *before* a merger is permitted. We therefore have an explicitly dynamic view of merger; we show that the optimal merger policy has to balance incentives for entry before merger against deadweight loss after merger.

A small number of more recent papers have used dynamic models to analyse merger incentives. Gowrisankaran (1999) uses the Ericson and Pakes (1995) framework to solve numerically for equilibrium merger, entry, exit, investment and production decisions. (See also Doraszelski and Pakes (2006).) The main objective of this paper is to demonstrate the feasibility of building the dynamic framework. In addition he finds that the prospect of merger increases the amount of entry—a point that we return to below. Pesendorfer (2005) obtains analytical results about merger incentives, again in a dynamic setting. He highlights some unexpected welfare implications. For example, he finds the possibility that profitable mergers in non-concentrated Cournot industries can reduce welfare. This is in contrast to the static analysis of e.g., Farrell and Shapiro (1990). Marino and Zabojnik (2005) look at how entry following merger can affect merger policy. Nocke and Whinston (2007) analyse optimal dynamic merger policy when merger proposals are endogenous and subsequent mergers may occur. We share the view of these papers, that it is important to incorporate dynamics into the analysis of mergers. Our focus is different, however. Unlike Gowrisankaran (1999) and Pesendorfer (2005), we look explicitly at merger policy. We determine when merger increases social welfare, and how much merger should be permitted by a policy-maker. Unlike Marino and Zabojnik (2005) and Nocke and Whinston (2007), we consider how merger affects entry *before* the merger.

A number of papers consider entry deterrence in a context where merger may occur; see e.g., Rasmusen (1988) and Saloner (1987). Rasmusen bears some similarity to aspects of our analysis. In his paper, an entrant incurs a sunk cost to enter an industry, knowing that the price after entry will be less than its average cost (but at least equal to its variable cost). It does so in the rational anticipation that the incumbent will buy out the entrant—effectively, pay for the entrant to exit. The same can happen in our model. The key additional factor that we introduce is *merger policy* : determining when the incumbent should be allowed to merge with the entrant. This issue is not considered at all by Rasmusen.

One interpretation of our proposed policy is a version of the "failing firm defence" (FFD). There are very few papers analyzing conditions under which failing firm mergers might be permitted. The only exception that we have been able to find is Persson (2005), who analyzes the welfare consequences of the FFD, concentrating on the *ex post* efficiency of sales of the failing firm's assets. He shows that the detailed provisions of the FFD do not ensure that the socially-preferred buyer obtains the assets; the focus of this work is thus quite different from ours.

Turning now to the empirical literature: there is little direct empirical evidence concerning the relationship between merger control and entry. However, there is anecdotal evidence that prospective exit routes, including acquisition by a buyer within the same industry, are an important consideration for some investors and for the entrepreneurs they support. Venture capitalists (VCs) typically seek to exit a venture in three to five years; moreover, since most of these investments initially do not earn positive cash flows, exit is the primary way for a VC to realize a positive return. The identification of exit possibilities is an important part of the due diligence process that VCs conduct before they decide to enter. Schwienbacher (2002) discusses this issue and provides an empirical analysis of VC exits in the U.S. and Europe; Cumming and MacIntosh (2003) examine VC exits in Canada and the U.S.. A trade sale or "acquisition exit", usually to a strategic acquiror that operates in the same business as the target firm, is the most common exit route for European VCs. According to the European Venture Capital Association (EVCA) 2004 annual survey of pan-European private equity and venture capital activity, trade sales represented almost 24 of all divestments in that year, while public offerings (IPOs and sales of quoted equity) made up less than 12 of the total (other exit routes include sale to another VC or financial institution, management buyout, and liquidation). Survey data (from 2001) collected by Armin Schwienbacher indicate a smaller differential for the

U.S., yet even there trade sale remains the most popular exit route. These data support the hypothesis that acquisition by an industry player is a potentially significant exit route, which may be taken into account by entrepreneurs and their financial backers. Moreover, as repeat investors, VCs might be expected to gain a good knowledge of merger policy, and to anticipate its implications.

As noted above, bankruptcy is also an exit route, specifically for firms experiencing financial distress. There is an established theoretical literature on the effect of bankruptcy procedures on *ex ante* decisions by firms and shareholders.[4] This theoretical literature is supported by growing empirical evidence of the importance of the relationship between bankruptcy procedures and *ex ante* decisions. Fan and White (2003) examine whether individuals are more likely to become entrepreneurs if they live in states in the U.S. with higher personal bankruptcy exemptions.[5] They find that households are more likely to own and start businesses if they live in states with higher bankruptcy exemption levels.[6] Armour and Cumming (2005) examine the relationship between bankruptcy and entrepreneurship for 15 countries in Europe and North America. They find the severity of personal bankruptcy laws (as measured by the time to discharge of pre-bankruptcy debts) to be a more statistically and economically significant determinant of self employment rates than GDP growth, stock market performance, and a number of other legal and economic factors.

These empirical findings accord with the informal, widely-held view that the U.S. approach to bankruptcy, being less punitive than most European countries' regimes, is a factor in accounting for the higher rate of entrepreneurial activity in the U.S.. As part of its program for enterprise and entrepreneurship, the European Commission highlights national bankruptcy laws as a factor which may facilitate entrepreneurial activity. The U.K. has recently reformed its bankruptcy regime to take account of its impact on entrepreneurial incentives: the Enterprise Act 2002 reduces the time to discharge to a maximum of twelve months in most

[4]Jensen and Meckling (1976) and Green (1984) argue that bankruptcy procedures can induce inefficient management decisions concerning investment, distribution of dividends and financing. Mooradian (1994) analyses the effect of bankruptcy protection on the*ex ante* investment policy of managers. Bebchuk (2002) shows how deviations from absolute priority in bankruptcy proceedings can bias managers in favour of choosing riskier projects. Many papers on bankruptcy procedures concentrate on *ex post* efficient division of bankruptcy value; see e.g., Hart (1995).

[5]Entrepreneurs filing for personal bankruptcy under Chapter 7 must give up all of their assets in excess of an exemption level in order to discharge their debts. Because exemption levels are set by the states they vary widely, while other elements of bankruptcy law are uniform across the U.S.

[6]Note that a higher level exemption may adversely affect the supply of funds to entrepreneurs, because financiers become less willing to lend. Nonetheless, the empirical evidence suggests that the demand effect dominates.

cases. The reforms were undertaken with the stated aim of encouraging entrepreneurship: with bankruptcy now being less onerous, the hope is that more entrepreneurs will take the step of starting a business.[7] However, recent reform of U.K. merger control—as part of the same Act—embodies no similar principle.

As a last bit of 'empirical' evidence, we note that Gowrisankaran (1999) finds, in his numerical analysis, that mergers increase the rate of entry considerably. The mechanism in his model is similar to ours: allowing for mergers adds another option to the potential entrant if it enters, and thus increases the value of entering the industry. With the parameters that he uses, the entry rate rises five-fold (from 0.3 to 1.6) when mergers are allowed.

In summary: the extensive theoretical analysis, and growing empirical evidence, of the relationship between bankruptcy and *ex ante* decisions lends weight to the likely relevance of our argument that merger policy affects entry and entrepreneurship.

Finally, we note that, at an abstract level, our argument is familiar: less *ex post* competition tends to result in more *ex ante* entry. (A similar message emerges from the 'real options' literature, which shows that in the face of uncertainty, a firm entering a market takes account of exit as well as entry costs.) Optimal policy should balance these two factors. Patent systems, for example, are designed to reflect this balance, allowing a temporary monopoly in order to stimulate competition and innovation. Our contribution is to apply this idea to merger policy, viewing merger as an exit route. To our knowledge, we are the first to do this.

The rest of the paper is structured as follows. In section 2, we present a two-period, reduced-form model illustrating the trade-off between encouraging entry and lower post-merger competition. Section 2.1 provides an explicit determination of equilibrium entry and merger decisions, and determines analytically the conditions under which it is socially optimal to relax merger policy to encourage entry. Section 2.2 characterizes the dependence of the optimal policy on key model parameters. In section 3 we assess various forms of strategic behaviour that might be employed by firms to manipulate profits and satisfy the merger rule, and assess their impact on policy. Section 4 discusses a number of factors: whether an alternative instrument might not be better for encouraging entry; the importance of market structure for the feasibility and desirability of promoting entry; and implementation of the policy. Section

[7]The Department of Trade and Industry (DTI) White Paper, "Insolvency—A Second Chance" (2001), states, "[W]e have to recognise that in a dynamic market economy some risk taking will inevitably end in failure. Fear of failure can act as a powerful disincentive to potential entrepreneurs.... [T]he Government intends to legislate for a major package of reforms to personal bankruptcy, to modernise the framework and to encourage entrepreneurship and responsible risk taking."

5 concludes. An appendix contains longer proofs.

2 A Two-Period Model

There are three players: an incumbent, an entrant, and the policy-maker. The incumbent operates in a market for two periods. At the start of period 1, the entrant chooses whether to enter or not. Following entry, the entrant competes with the incumbent in period 1 and, unless merger takes place, in period 2. The policy-maker sets policy at the outset (i.e., before the entrant chooses whether to enter and before any information is revealed), and cannot change this policy once it is set. (We therefore abstract away from commitment issues.) The policy that we consider concerns merger: the firms may be permitted to merge in period 2, after information about profitability is received, if this profitability is sufficiently low. When merger occurs, competition between the firms ceases.

If it chooses to enter, the entrant incurs a sunk entry cost, k. This is distributed uniformly on $[0, K]$, where K is sufficiently large (we comment further on this below). The entry cost is known to the firms before the entrant takes its entry decision, but is unobserved by the policy-maker at any stage. The entrant's per-period operating profit is π; this is a random variable (perhaps due to uncertainty over operating costs) realized in the first period, after the entry decision is taken and the entry cost incurred. Moreover, π is observed by the policy-maker only at the end of period 1. The common prior is that π is distributed uniformly on the interval $[0, 1]$.[8]

Let $\Delta\Pi > 0$ denote the incremental profit from merger; this equals the difference between monopoly and combined duopoly profits (its sign follows from the standard 'efficiency effect': see e.g., Tirole (1988)). Bargaining is assumed to be efficient, so that merger always takes place when permitted. The entrant's payoff from merger, over and above its operating profit π, is given by $B > 0$. This equals the entrant's share of the incremental profit from merger, and may also be written as $b\Delta\Pi$, where $b \in [0, 1]$ reflects the entrant's bargaining strength. (In section 3, we model the payoff from merger and strategic firm behaviour more explicitly, in place of the reduced-form profit functions used in this section. The basic story is unchanged.)

[8]The restriction that $\pi \geq 0$ is made for convenience: otherwise, the situation might arise in which the entrant's operating profit is strictly negative and exit is desirable. This consideration can be incorporated into the model, at the cost of greater complexity; the fundamental insights of the model are unaffected by the restriction.

The policy-maker's social welfare function (SWF) is $W = C + \lambda\Pi$, where C denotes consumer surplus and $\lambda \in [0,1]$ is the weight on firm profits. In the special case of a fully consumerist policy-maker, no weight is placed on profits: $\lambda = 0$. Let $S(\lambda)$ denote the change in per-period social surplus (excluding fixed costs) arising from competition. From the SWF, we can write $S(\lambda) \equiv \Delta C - \lambda\Delta\Pi$, where Δ denotes changes arising from competition. The surplus $S(\lambda)$ is lost if merger occurs. Since monopolization typically creates deadweight loss, it is natural to assume that $\Delta C - \Delta\Pi > 0$, so that $S(\lambda) > 0$. Note that for a consumerist policy-maker, $S(0) > B$ (this need not hold for $\lambda > 0$).

Both firms and the policy-maker use the common discount factor $\delta \in (0,1)$; this reflects the time that elapses between entry and possible merger, as well as the rate of time preference.

The policy-maker sets policy at the outset, before it knows the realization of the entrant's profitability π. In addition, the policy-maker does not observe the entry cost k, either when setting the policy or when implementing it in period 2. The chosen policy is to allow merger in the second period iff the realization of π is sufficiently low—below π_M, say. (Note that the policy cannot be conditioned on the entry cost, as this is not observed by the policy-maker.) A higher choice of π_M entails more lenient merger policy. In the next section we discuss this form of policy and consider possible alternatives.

In summary, then, the timing of the game is as follows:

$t = 0$: the policy-maker sets π_M; k is realized; the entrant decides whether to enter or not;

$t = 1$: π is realized; if entry occurred at $t = 0$, then the firms compete;

$t = 2$: if entry occurred at $t = 0$, then the firms merge if permitted, otherwise they compete.

The key question is: what is the (socially) optimal level of π_M? If merger is never socially desirable, then the optimal level is $\pi_M = 0$; conversely, if merger is socially desirable at all levels of π, then the optimal $\pi_M = 1$.

2.1 Optimal merger policy

If merger is not permitted at any profitability level, then the entrant's expected value from entry is $V = \frac{1}{2}(1+\delta) - k$. Entry occurs iff $k \leq \frac{1}{2}(1+\delta)$. Note that since the entry cost is entirely sunk and the flow profit is always non-negative, the entrant will continue to operate even when merger is not permitted.

If merger is permitted in period 2 for $\pi \leq \pi_M$, then the expected value of entry is

$$V_M = \frac{1}{2}(1+\delta) + \delta B \pi_M - k.$$

Entry occurs iff

$$k \leq \frac{1}{2}(1+\delta) + \delta B \pi_M \equiv k_M(\pi_M). \tag{1}$$

Note that k_M is an increasing function of π_M: more lenient merger policy encourages entry. Given the prior distribution of k, the probability of entry is $\rho_M = k_M(\pi_M)/K$. To ensure that this probability lies in the interval $[0,1]$, we assume throughout that

$$K > \frac{1}{2}(1+\delta) + \delta B.$$

Social welfare, relative to the no-entry benchmark, is given by

$$W(\pi_M) = \frac{k_M(\pi_M)}{K}\left(S(\lambda)(1+\delta-\delta\pi_M) - \frac{1}{2}\lambda k_M(\pi_M)\right). \tag{2}$$

Proposition 1 demonstrates that lenient merger policy—meaning any merger threshold above $\pi = 0$—is socially optimal, as long as the social surplus gain from competition $S(\lambda)$ and the entrant's merger benefit B are both sufficiently large.

Proposition 1 *Lenient merger policy ($\pi_M > 0$) is optimal if and only if both of the following conditions are satisfied: (i) $S(\lambda) > \frac{\lambda}{2}$ and (ii) $B > \frac{S(\lambda)}{2S(\lambda)-\lambda}$.*

Proof. The social welfare function $W(\pi_M)$ is strictly concave and differentiable in π_M. Hence the optimal π_M is greater than zero if and only if the derivative of the social welfare function is positive at $\pi_M = 0$. Evaluating

$$\left.\frac{\partial W(\pi_M)}{\partial \pi_M}\right|_{\pi_M=0} = \frac{\delta(1+\delta)}{2K}\big((2S(\lambda)-\lambda)B - S(\lambda)\big),$$

it can be seen that the sign of this derivative is determined by the sign of $(2S(\lambda)-\lambda)B - S(\lambda)$. If $2S(\lambda) > \lambda$, then the sign is positive if $B > \frac{S(\lambda)}{2S(\lambda)-\lambda}$; otherwise it is negative. ■

In the case of a consumerist policy-maker (i.e., when $\lambda = 0$), a condition on B alone is sufficient for leniency to be welfare-increasing.

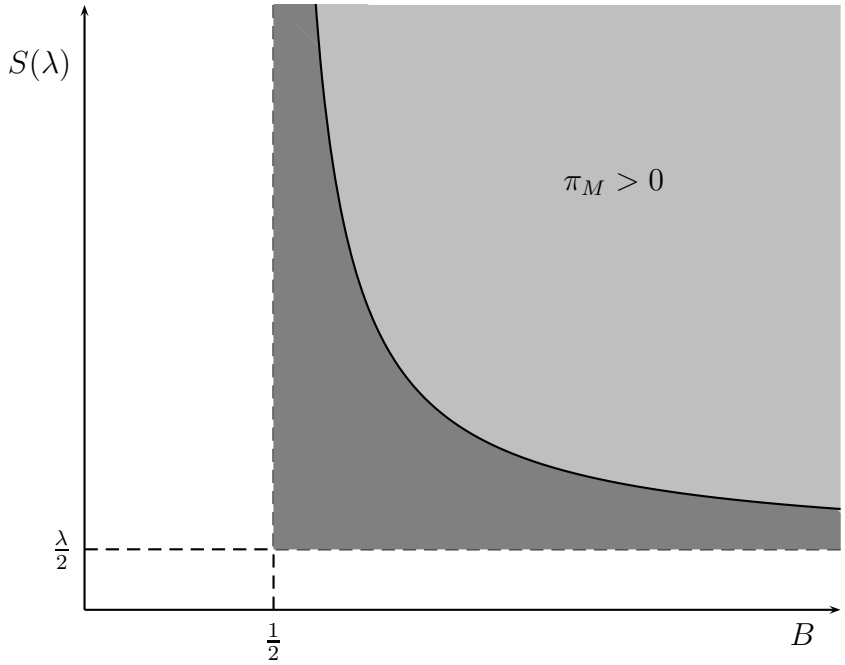

Figure 1: Illustration of Proposition 1

Corollary 2 *For a consumerist policy-maker, for whom $\lambda = 0$, lenient merger policy is optimal whenever $B > \frac{1}{2}$.*

For lenient merger policy to be optimal in general, the increase in social surplus resulting from competition must be large enough; but in the consumerist case *any* social surplus gain is sufficient. In addition, the entrant's benefit from merger must be sufficiently large: otherwise the entry-increasing effect of the policy is too small for the post-merger reduction in competition to be worthwhile. This is illustrated in figure 1, which shows the region (shaded light gray) of values of B and $S(\lambda)$ over which lenient merger policy is optimal. As the figure shows, lenient policy requires that both B and $S(\lambda)$ are sufficiently large.

Note that the conditions in Proposition 1 are more likely to be met for smaller λ (recalling also that $S(\lambda)$ is a decreasing function of λ); thus leniency is more likely to be optimal when the policy-maker places more weight on consumer surplus. This is the opposite of what might be expected in the current practice of merger control, where a consumerist policy-maker cares more about the loss of consumer surplus following merger, and hence is more likely to prohibit the transaction. In terms of figure 1, a decrease in λ shifts the curve downwards, so that leniency is optimal over a larger region of the parameter space. In the limit, as λ goes to zero and the policy-maker places no weight on firms' profits, the curve becomes 'L'-shaped. The

region of parameter values over which lenient merger policy is optimal becomes the union of the dark and light gray areas.

Focusing on the consumerist case $\lambda = 0$, how plausible is the condition $B > \frac{1}{2}$? Since the prior distribution of π is uniform on $[0, 1]$, the entrant's *ex ante* expected operating profit per period is $\frac{1}{2}$; thus, its payout from merger must exceed this amount. Writing $B = b\Delta\Pi$, two factors are relevant: the incremental profit from merger $\Delta\Pi$, i.e., the difference between monopoly and combined duopoly profits; and the entrant's bargaining power b in merger negotiations. Hence, lenient merger policy is more likely to be optimal when competition markedly reduces total profit, and when the entrant's bargaining position is strong.[9]

2.2 Characteristics of the optimal policy

The interior solution for welfare optimization is given by

$$\pi_M^* = \frac{1}{2}\frac{(1+\delta)}{\delta}\frac{(2BS(\lambda) - S(\lambda) - \lambda B)}{B(2S(\lambda) + \lambda B)}. \tag{3}$$

Comparative static properties of the optimal policy (when this is positive) are given by Proposition 3.

Proposition 3 *The optimal interior merger policy π_M^* is*

(a) increasing in $S(\lambda)$;

(b) decreasing in δ;

(c) increasing (decreasing) in B if $2S(\lambda)(S(\lambda)+\lambda B)-\lambda B^2(2S(\lambda)-\lambda) > (<)0$. If $\lambda = 0$ this partial derivative is always positive. Otherwise, there exists a critical $\widehat{B} \equiv \frac{S(\lambda)}{2S(\lambda)-\lambda}(1 + \sqrt{\frac{4S(\lambda)}{\lambda} - 1})$ such that π_M^* is increasing in B for $B \in (\frac{S(\lambda)}{2S(\lambda)-\lambda}, \widehat{B})$ and decreasing for $B > \widehat{B}$; and

(d) decreasing in λ.

[9] In our reduced-form model, the entrant's bargaining share b is taken to be independent of other parameters, e.g., S, $\Delta\Pi$. In reality, underlying characteristics that give the entrant a strong bargaining position may also cause it to be a particularly fierce competitor, whose entry yields a larger social benefit S. We have also ignored the possibility that the policy-maker attempts to infer from the entrant's bargaining share information about profitability—in our model, the unobserved entry cost k. (The latter consideration appears to have arisen in some of the cases discussed in the introduction.) The inclusion of such relationships between parameters would generate a richer model, but would not fundamentally alter the analysis.

Proof. See the appendix. ■

The optimal policy is more lenient for a larger social surplus gain from competition; for a smaller discount factor; when the entrant receives a greater benefit from merger (under certain conditions); and for a more consumerist policy-maker. (Note that since $S(\lambda)$ is a decreasing function of λ, the direct and indirect effects of λ reinforce one another.)

The intuition for these results can be explained as follows. In choosing π_M the policy-maker faces a trade-off between three effects:

- The *competition effect*: when merger takes place there is a loss of competition (compared with the immediately preceding situation), reducing social surplus in the second period.
- The *entry encouragement effect*: more lenient merger policy stimulates entry, increasing expected social surplus in the first period.
- The *sunk cost effect*: greater entry entails higher expected sunk costs, reducing social welfare (except in the case of a consumerist policy-maker).

The comparative static result in $S(\lambda)$ indicates that the entry encouragement effect outweighs the competition effect. Although the surplus change in each case is of equal magnitude, the benefit from greater entry outweighs the loss of competition due to merger, since the latter is discounted while the former is not. With a higher discount factor this effect is less significant, and so the optimal policy is less lenient.

A more consumerist policy-maker (lower λ) places less weight on the entrant's sunk cost; with the sunk cost effect being less important, this policy-maker prefers greater leniency. For a given social surplus $S(\lambda)$, a larger merger benefit to the entrant, B, strengthens the entry encouragement effect while leaving the competition effect unchanged. This raises the benefit of lenient policy, until this effect is counter-balanced by the sunk cost effect. The consumerist policy-maker ignores the sunk cost effect; hence the comparative static in B is always positive in this case.

Results are particularly stark for the consumerist policy-maker, as set out in Proposition 4.

Proposition 4 *With a consumerist policy-maker (for whom $\lambda = 0$) with $B > \frac{1}{2}$,*

(a) leniency is always the optimal policy;

(b) the optimal merger policy, $\pi_M^* = \frac{(1+\delta)(2B-1)}{4\delta B}$*, is*

(i) independent of S*;*

(ii) increasing in B*; and*

(iii) decreasing in δ*.*

The proof is straightforward and so is omitted.

Finally, we note that we have treated the degree of uncertainty about profitability as fixed. To check the implications of this, we have analyzed a version of the model in which the distribution of π is uniform on $[\frac{1}{2} - \sigma, \frac{1}{2} + \sigma]$, where $0 < \sigma \leq \frac{1}{2}$ is a parameter measuring the degree of uncertainty. Specifically, σ is a mean-preserving spread. (The model that we have analyzed so far corresponds to the case that $\sigma = \frac{1}{2}$.)

The results in propositions 1–4 are unchanged by this parameterization. The derivations are lengthened considerably, however, so we omit the detail here.[10] With lenient merger policy, greater uncertainty stimulates entry, strengthening the entry encouragement effect. This is because with more uncertainty, the merger option is more likely to be exercised and hence is more valuable, raising the value of entry. The effect of uncertainty on the optimal interior merger policy is ambiguous, however. The enhanced entry encouragement effect makes leniency more attractive. But greater uncertainty also raises the probability that (for a given threshold) the condition for merger clearance is triggered, worsening the competition effect. The strength of the entry encouragement effect is linked to the entrant's gain from merger B; so the impact of uncertainty on the optimal policy depends crucially on this factor. We can show that for sufficiently large B, an increase in uncertainty makes the optimal policy more lenient.

In the remainder of the paper we focus on the case of a consumerist policy-maker, setting $\lambda = 0$ throughout. This seems a reasonable interpretation of policy-maker objectives given the practice of merger control in most major jurisdictions.[11] There is also analytical support for this stance. Besanko and Spulber (1993) suggest that greater weight should be attached to consumer welfare to counter-balance the asymmetric information facing the policy-maker about possible cost savings from merger. Neven and Röller (2005) take into account lobbying

[10] Details of this extension are available from the authors on request.

[11] In making merger assessments, regulators do not trade-off higher profits against consumer detriments; cost savings are taken into account only if consumers benefit through lower prices.

by merging firms, and the personal benefits this may bring to regulators; they show that raising the weight on consumer surplus can be an appropriate counter-balance to such lobbying.

3 Merger Policy with Strategic Behaviour

Policy-makers may be reluctant to use merger policy to encourage entry for two reasons. First, policy-makers cannot accurately observe the true profits of firms. Secondly, firms can use this fact and manipulate profits to pass the merger requirement. These issues have not arisen in our analysis, so far, for two reasons: we have assumed that the policy-maker can observe π perfectly; and strategic behaviour is not possible within the reduced-form approach to the mode of competition. Since the firms are unable to influence either the level or the observation of π, there is no scope for strategic behaviour to influence the policy-maker.

In this section we relax these assumptions to assess the effect of strategic behaviour on policy. Specifically, firms may distort their decisions in the first period in order to ensure that profit (of one firm or the other) hits the merger threshold π_M. This possibility can create an interesting trade-off for the policy-maker. In the first period, consumer surplus may be increased by this strategic behaviour—for example, a price cut that reduces profit to π_M also reduces the deadweight loss from market power. But in the second period, consumer surplus is lowered by the merger that follows. This is analogous to the familiar trade-off arising from predation, which generates the short-run benefit of heightened competition but at the cost of weaker competition in the long run. However, in our analysis an additional factor arises: the entry encouragement effect of strategies that raise the value of entry. In other words, the possibility of strategic behaviour can benefit consumers not only by directly lowering prices in period 1, but also by increasing the extent of entry.

A variety of scenarios is possible, depending upon which firm engages in strategic behaviour, which one is the target, and whether there is co-operation between the firms in manipulating the policy. A full analysis of the broad range of competitive situations and strategies is not possible in the context of the present paper. We therefore provide an illustrative example and consider three possible strategies, assuming that the entrant is the target firm, and derive the optimal merger policy in each case. After describing the model in section 3.1, section 3.2 assesses two profit-reducing strategies that may be employed by the entrant. Finally, in section 3.3, we consider the possibility of predation by the incumbent.

3.1 A model of entry and competition

This section sets out a stylized price-setting model underpinning the reduced form described in section 2. This can be used to assess the scope for, and impact of, strategic behaviour.

The incumbent operates in a market with inelastic unit demand up to a reservation value, S. Acting as a monopolist, the incumbent sets price $P = S$ and extracts the entire surplus. The incumbent's unit production cost is normalized to zero. Before commencing production, the entrant must incur a sunk entry cost $k \sim U[0, K]$, where k is known to the firms but not the policy-maker. Following entry, the entrant's unit production cost is revealed to both firms but not to the policy-maker; this is lower than the incumbent's cost by an amount $\theta \sim U[0, 1]$. The firms produce homogeneous goods and compete in prices; thus post-entry competition drives the price down to (just below) the incumbent's cost. Consumer surplus is now S; the incumbent makes no profit,[12] while the entrant gains a profit of θ.

If merger is permitted, monopoly pricing is re-established but production takes place at the entrant's lower unit cost. The combined benefit to the firms (relative to the competitive situation) is S. Of this amount, the entrant obtains a share $b \in [0, 1]$ (over and above its pre-merger profit θ); thus the entrant's merger benefit is $B = bS$, while the incumbent gains $(1 - b)S$.

The policy-maker has a consumerist SWF ($\lambda = 0$). Before entry and after merger, welfare is zero; during a period of competition, welfare is S . At the end of period 1, the policy-maker observes the entrant's per-period profit, but not underlying demands, prices, outputs or the entrant's sunk cost. The policy-maker sets merger policy as described in section 2, allowing merger in period 2 iff the entrant's profit is below a threshold π_M.

Without the possibility of merger, entry occurs for $k \leq \frac{1}{2}(1 + \delta)$. With the merger rule π_M, entry occurs for $k \leq k_M(\pi_M) \equiv \frac{1}{2}(1 + \delta) + \delta B \pi_M$. Expected welfare is given by

$$W(\pi_M) = \frac{k_M(\pi_M)}{K} S(1 + \delta - \delta\pi_M), \tag{4}$$

and the interior solution for welfare optimization is

$$\pi_M^* = \frac{(1 + \delta)(2B - 1)}{4\delta B}. \tag{5}$$

[12]For those troubled by the implication that following entry the incumbent makes no sales, the market in question could be a small part of its operations—perhaps a distinct geographic market or customer group—while it continues to make sales elsewhere.

In analyzing strategic behaviour, we assume that the condition for leniency to be optimal in the non-strategic case, $B > \frac{1}{2}$, is satisfied. We consider what additional conditions are necessary for leniency to be desirable when firms behave strategically, and compare the resulting merger rules.

3.2 Strategic behaviour by the entrant

Strategic behaviour is unnecessary for $\theta \leq \pi_M$: merger is permitted anyway. For $\theta > \pi_M$, the entrant considers deliberately reducing its period 1 profit to π_M in order for merger to be permitted. We consider the following profit-reducing strategies: (i) a price cut; or (ii) wasteful expenditure.

3.2.1 Strategic price-cutting

To meet the profit threshold, the entrant reduces its period 1 price (and profit) by the amount $\theta - \pi_M$. Following merger clearance in period 2, the entrant gains B; thus its payoff from strategic behaviour is $\delta B - \theta + \pi_M$. Strategic behaviour is worthwhile for $\theta \in (\pi_M, \pi_M + \delta B)$.

The entry decision is affected by the possibility of strategic behaviour. With strategic behaviour, the value of entry is

$$\frac{1}{2}(1+\delta) + \delta B \pi_M + \frac{1}{2}\delta^2 B^2 - k.$$

Hence entry occurs for

$$k \leq \frac{1}{2}(1+\delta) + \delta B \pi_M + \frac{1}{2}\delta^2 B^2 \equiv k_S(\pi_M). \tag{6}$$

Comparing equations (6) and (1) gives directly Proposition 5.

Proposition 5 *Given $\pi_M > 0$, the possibility of strategic behaviour by the entrant stimulates entry: $k_S > k_M$.*

This entry encouragement effect increases, rather than reduces, the attraction of lenient merger policy, other things equal. The possibility of strategic price-reducing behaviour affects welfare, and hence the optimal policy, in a number of ways:

- The *direct effect*: strategic price-cutting increases consumer surplus in period 1.

- The *competition effect*: merger takes place more frequently, tending to reduce competition in period 2.
- The *entry encouragement effect*: the possibility of strategic behaviour stimulates entry, tending to increase competition.

Effects similar to the first two exist in the analogous situation of predation, but the third effect is new. Proposition 6 sets out conditions for lenient merger policy to be optimal and draws comparisons with the non-strategic case.

Proposition 6 *Under strategic price-cutting,*

(a) Leniency is optimal iff $\delta < \widetilde{\delta}^{(1)} \leq 1$ *, where* $\widetilde{\delta}^{(1)} \equiv \frac{1}{X}(1+\sqrt{2X+1})$ *and* $X \equiv \frac{2B^2(3-b)}{(2B-1)} > 0$*; thus leniency is optimal over a smaller range of parameter values than in the non-strategic case.*

(b) The optimal merger policy,

$$\pi_M^{(1)} = \pi_M^* - \frac{1}{4}\delta B(3-b), \tag{7}$$

is stricter than in the absence of strategic behaviour, i.e., $\pi_M^{(1)} < \pi_M^*$*.*

Proof. See the appendix. ■

To illustrate the condition in part (a): with $B = 1$ and $S = 2$, and thus $b = \frac{1}{2}$, leniency is optimal for $\delta < \widetilde{\delta}^{(1)} \approx 0.86$. Intuitively, a smaller discount factor puts less weight on the competition effect relative to the other two effects, since the competition effect occurs only in the second period. Period-1 effects are therefore relatively more important; hence a lower discount rate favours leniency as the optimal policy.

3.2.2 Wasteful expenditure

The previous strategy might be criticized as too favorable:[13] since the strategy itself is welfare-increasing in the short run, it is unsurprising that leniency may be socially desirable. Next we consider a strategy that yields no direct benefit to consumers: instead of cutting its price to

[13]We are grateful to Kenneth Simons for encouraging us to consider this point.

meet the profit target, the entrant incurs wasteful expenditure. [14] We find that, even without the direct benefit, the entry encouragement effect may nonetheless make leniency a desirable policy.

The entrant's decisions vis-à-vis strategic behaviour and entry are the same as for the previous strategy; i.e., k_S remains the relevant entry criterion. Expected welfare for any given π_M is lower, however, implying stricter policy. Proposition 7 sets out conditions for lenient merger policy to be optimal and draws comparisons with the price-cutting strategy.

Proposition 7 *Under the wasteful expenditure strategy,*

(a) Leniency is optimal iff $\delta < \widetilde{\delta}^{(2)} < 1$, *where* $\widetilde{\delta}^{(2)} \equiv \frac{1}{Y}(1 + \sqrt{2Y+1})$ *and* $Y \equiv \frac{6B^2}{(2B-1)} > 0$. *This is stricter than the equivalent condition for the price-cutting strategy: leniency is optimal over a smaller range of parameter values.*

(b) The optimal merger policy is given by

$$\pi_M^{(2)} = \pi_M^* - \frac{3}{4}\delta B. \tag{8}$$

With $b > 0$, *the ranking of merger rules in the three cases is as follows:*

$$\pi_M^{(2)} < \pi_M^{(1)} < \pi_M^*. \tag{9}$$

Proof. See the appendix. ■

(For comparison with the previous case, with $B = 1$, $\widetilde{\delta}^{(2)} \approx 0.77$.) The intuition for this result is quite straightforward. The wasteful expenditure strategy does not yield the direct benefit of lower prices in period 1 that results from the price-cutting strategy. As a result, allowing merger (which generates the incentive for strategic behaviour by the entrant) is less attractive in this case. Nevertheless, the optimal policy is lenient for sufficiently low discount factors. Again, the intuition is that the competition effect is dominated by the entry encouragement effect when δ is small.

To conclude: the prospect of strategic behaviour by the entrant does not remove the argument for our proposed merger policy, although the precise conditions are changed. For the

[14] We assume that accounting manipulation to meet the target is not possible; allowing this possibility would reduce the cost of strategic behaviour, further stimulating entry.

cases we have studied, the conditions for leniency to be desirable are tighter, and the optimal degree of leniency is lower, in the presence of strategic behaviour. Moreover, strategies that benefit consumers in the short run invite leniency more often, and of a greater degree, than ones that do not.

3.3 Strategic behaviour by the incumbent

We now turn to possible strategic behaviour by the incumbent. We first consider the possibility that the incumbent predates the entrant in order to reduce the latter's profits to the merger threshold. Predation can be achieved only via a price reduction: this is the only strategic variable available to the incumbent by which it can influence the entrant's profit.

Predation is unnecessary for $\theta \leq \pi_M$. For $\theta > \pi_M$, the incumbent may wish to engage in predation. How might this be implemented, and when would it be profitable? The incumbent can reduce the entrant's profit to π_M by offering to sell the product at a price that is π_M above the entrant's production cost (and thus below its own cost). The entrant just undercuts this price in order to maintain its sales, but makes a smaller profit than in the absence of predation.

Suppose that the cost of the strategy to the incumbent is $(\theta - \pi_M)$.[15] We assume that pre-merger predation does not affect the division of the merger surplus: since continued predation is not credible here, the assumption is not unreasonable. When merger occurs in period 2, the benefit to the incumbent, given its share of the merger surplus, is $(1-b)S$. The incumbent's net gain from predation is $\delta(1-b)S - \theta + \pi_M$; thus predation is worthwhile for $\theta \in (\pi_M, \pi_M + \delta(1-b)S)$.

The entrant's entry decision is affected by the possibility of predation and subsequent merger. But now the effect is ambiguous: the entrant's period 1 profit is reduced by predation, while it gains some benefit from merger in period 2; thus entry may be either encouraged or inhibited. Proposition 8 determines the conditions for each possibility.

Proposition 8 *Compared with the non-strategic case, entry is increased (reduced) by the possibility of predation for* $b > (<)\frac{1}{3}$. .

[15] In theory, Bertrand competition implies that the incumbent can reduce the entrant's profits merely by offering the good for sale at a lower price. However, it is more plausible to assume that predation is not costless to the predator and, moreover, that its cost is increasing in the entrant's relative efficiency θ and decreasing in the merger threshold π_M . We therefore adopt a simple functional form in which these relationships hold. The cost can be thought of as lower profits achieved from sales in other markets, with price discrimination being impossible.

Proof. Given the incumbent's strategy, the entrant enters for $k \leq \frac{1}{2}(1+\delta)+\delta B\pi_M+\frac{1}{2}\delta^2 S^2(1-b)(3b-1) \equiv k_P(\pi_M)$. Comparing this with (1), we can write $k_P = k_M + \frac{1}{2}\delta^2 S^2(1-b)(3b-1)$. Thus $k_P > (<) k_M$ for $b > (<)\frac{1}{3}$. ■

Predation affects welfare, and hence the optimal policy, through three distinct routes, similar to those described in section 3.2.1:

- The *direct effect* of low prices in period 1.
- The *competition effect* of more frequent merger in period 2.
- The *entry encouragement effect*, which may go in either direction (as described by Proposition 8).

Proposition 9 sets out conditions for lenient merger policy to be optimal given the possibility of predation, and draws comparisons with the non-strategic case.

Proposition 9 *Given the possibility of predation,*

(a) Leniency is optimal if either of the following cases holds:

(i) $b < \widetilde{b} \equiv \sqrt{5} - 2$*; or*

(ii) $b > \widetilde{b}$ *and* $\delta < \widetilde{\delta}^P$*, where* $\widetilde{\delta}^P \equiv \frac{1}{Z}(1+\sqrt{2Z+1})$*,* $Z \equiv \frac{2B^2}{(2B-1)}\frac{(1-b)}{b^2}(b^2+4b-1)$ *and* $\delta \in [0,1]$.

(b) The optimal merger threshold is given by

$$\pi_M^P = \pi_M^* + \frac{1}{4}\delta B\frac{(1-b)}{b^2}(1-4b-b^2). \tag{10}$$

The optimal policy is more (less) lenient than in the absence of predation for $b < (>)\widetilde{b}$.

Proof. See the appendix. ■

To conclude: the possibility of predation does not remove, and may even strengthen, the argument for the proposed merger policy. Smaller b (and hence larger $(1-b)$) increases the extent of predation, since predation is more worthwhile for the incumbent when it receives a larger fraction of the merger surplus. This strengthens the direct effect—low period 1 prices

occur over a wider range of θ—which raises welfare, but may hold back entry. The role of b in Proposition 9 suggests that the former effect dominates.

We have assumed that the game is played only once, so that the incumbent faces entry (and the possibility of subsequent merger) by a single competitor. There may, however, be many potential entrants over time. In this case, the incumbent may attempt to develop a reputation as a tough competitor who never merges with entrants, in order to discourage future entry. (This could be supported by modelling reputation as in Kreps and Wilson (1982) and Milgrom and Roberts (1982): there is a small probability that the incumbent is a 'crazy' type who never agrees to merger, if even it would increase its current profit by doing so.) While this is certainly a theoretical possibility, we are doubtful about its practical relevance for policy: we suspect that entry and merger does not occur sufficiently frequently in the same industry, and with the same potential bidder, to support such a reputation story. Moreover, this form of strategic behaviour by the incumbent would call for *more* lenient merger policy, and so would reinforce the need for lenient merger policy to encourage entry.

Finally, we have focused on strategies employed by one firm alone. More complex strategy combinations are possible, including those where each firm engages in strategic behaviour over some range of the cost variable θ . With $b < \frac{1}{2}$, the incumbent is willing to act strategically at values of θ above the entrant's upper threshold. One possibility is then that the entrant acts strategically for θ a little above π_M , while the incumbent predates at higher values until its own upper threshold is reached. Although more complex, such possibilities could also be assessed within the framework used here; the basic message will not change.

4 Discussion

In this section, we discuss a number of issues that have, so far, been omitted from our analysis. The objective of the section is to assess the robustness of our story to these omitted issues. First, we consider whether it would in fact be better for the policy-maker to use some other policy, instead of merger policy, in order to encourage entry. We then discuss alternative market structures, considering the desirability or the effectiveness of using the proposed merger policy to encourage entry in different situations. Finally, we discuss briefly implementation issues.

4.1 Alternative policies for encouraging entry

Is the form of the proposed merger policy appropriate? And is merger policy is the right tool for addressing the inefficiency of market power, or are there better, alternative policies?

We have modelled merger policy as a profitability threshold below which merger is permitted. Viewed *ex ante*, before its profitability is known, the entrant faces a probability (given by π_M) that merger will be permitted. The same impact on its expected payoff could be achieved by a policy that permits merger in the corresponding proportion of cases, choosing these randomly. However, as well as providing a coherent and predictable rule as to when merger will be allowed, there are two reasons why our form of merger policy is desirable.

First, if entrepreneurs exhibit risk-aversion, however small, there is more benefit from a policy that increases their payoff in states where profit is low. By providing an element of insurance, the policy has a stronger effect on entry and hence on competition in the long run. Secondly, if low profitability is due to deficient demand rather than high operating costs, firm profits and deadweight losses move together. Then allowing merger at times of low profitability minimizes the social cost of the policy, while entry, taking place before profitability is known, occurs at times when the social benefit is greater on average.

Turning to the second question, possible alternatives to proposed merger policy include a subsidy for new entrants, or a subsidy paid to firms during hard times. Although these policies might also be expected to stimulate entry, while avoiding the reduction in competition resulting from more lenient merger control, we argue that both carry disadvantages compared with the merger policy tool.

Any subsidy paid by the policy-maker requires public funds to be raised through taxation, creating distortions elsewhere in the economy. Although perhaps less obvious than the distortion created by market power following a merger, this also entails a cost which should be taken into account in policy design.

This issue can be examined within the framework of section 2. As before, the policy-maker cannot observe the entrant's sunk cost and so cannot condition policy on this. The policy-maker pays an entry subsidy E to any entrant, but never permits merger. The entry subsidy must be financed out of public funds which entails some distortion: to capture this, the cost of paying the subsidy is RE, where $R \geq 1$.

Including the entry subsidy, the value of entry becomes $V_E = \frac{1}{2}(1+\delta) + E - k$; thus entry occurs iff $k \leq \frac{1}{2}(1+\delta) + E \equiv k_E$. The probability of entry is $\rho_E = k_E(E)/K$; hence social

welfare (taking the consumerist case throughout) is given by

$$W(E) = \frac{k_E(E)}{K}(S(1+\delta) - ER). \tag{11}$$

Proposition 10 describes when payment of an entry subsidy is optimal.

Proposition 10 *Payment of an entry subsidy ($E > 0$) is optimal if and only if $R < 2S$.*

Proof. The welfare function $W(E)$ is strictly concave and differentiable in E. Evaluating the partial derivative w.r.t. E at $E = 0$,

$$\left.\frac{\partial W(E)}{\partial E}\right|_{E=0} = \frac{1}{2K}(1+\delta)(2S - R), \tag{12}$$

it can be seen that its sign is determined by the sign of $2S - R$. Thus subsidy ($E > 0$) is optimal iff $R < 2S$; for $R > 2S$ the social cost of the funds needed to pay the subsidy exceeds its benefits and no subsidy should be paid. ■

The interior solution for welfare optimization is given by

$$E^* = \frac{1}{4R}(1+\delta)(2S - R). \tag{13}$$

This is increasing in S and δ, and decreasing in R.

There are parameter ranges over which one policy is desirable but the other is not. For $B < \frac{1}{2}$, the merger tool is undesirable, but an entry subsidy might be recommended; while for $R > 2S$, entry should never be subsidized but the merger tool could be beneficial. In cases where either policy would be beneficial (i.e., for $B > \frac{1}{2}$ and $R < 2S$), which one achieves higher welfare? The answer depends on the relative magnitudes of R , S and B, as set out in Proposition 11.

Proposition 11 *When both policies are socially beneficial, the merger tool achieves higher (lower) welfare than the entry subsidy for $R > (<)\frac{S}{B}$.*

Proof. See the appendix. ■

The result is intuitive: R and $\frac{S}{B}$ measure the social cost of encouraging entry by a given amount for, respectively, the entry subsidy and the merger policy. When funds can be raised more efficiently through taxation, the entry subsidy is preferable; otherwise, the merger policy

is better. Moreover, when $R > 2S$, it is never desirable to subsidize entry, while lenient merger policy is optimal for $B > \frac{1}{2}$.

To conclude: even within this limited analysis, it is not the case that our proposed merger policy is always dominated by an entry subsidy.

There is a further reason why an entry subsidy may be an inappropriate policy to use. It may encourage transitory entry by firms that do not intend, or have little prospect of, remaining active in the market. This generates little or no benefit to consumers, while incurring the full cost of the subsidy. By contrast, the proposed merger policy encourages only entrants that bring effective and sustained competition: otherwise there is little or no merger surplus, no incumbent will pay a significant amount to merge with the entrant, and the entry encouragement effect will be slight.

4.2 Market structure, excess entry and merger incentives

In this section, we discuss alternative market structures, the possibility of excessive entry and merger incentives. These issues affect the desirability or the effectiveness of using the proposed merger policy to encourage entry.

The point that we make extends beyond the particular set-up, of a single incumbent and single potential entrant, that we adopt. We require two conditions for our argument: first, entry must be socially desirable; and secondly, merger must increase the profits of the merging firms (in particular that of the entrant). Previous work has shown that these two conditions need not always hold. Mankiw and Whinston (1986) demonstrate that there is a tendency for excessive entry in homogeneous good industries. Salant, Switzer, and Reynolds (1983) show that the profit of a single, merged firm may sometimes be lower than the sum of the pre-merger profits of its constituent firms.

We cannot expect, then, lenient merger policy always to be socially desirable or effective in encouraging entry. From previous work, the 'worst case' for our story involves a Cournot oligopoly with homogeneous goods where there are no technological synergies from merger. In this case, free entry generates excess entry (Mankiw and Whinston (1986)); and merger between any two firms (other than a duopoly) is not profitable for the merging firms (Salant, Switzer, and Reynolds (1983)). Greater entry worsens welfare;[16] and merger policy is anyway

[16]Despite Mankiw and Whinston's analysis, antitrust authorities typically regard entry as socially desirable, perhaps reflecting an underlying consumerist welfare function.

ineffective in encouraging entry.

On the other hand, the most favorable conditions for our story involve differentiated goods Bertrand competition. Mankiw and Whinston (1986) show that product variety can lead to insufficient entry in equilibrium, so that entry encouragement is socially desirable. Deneckere and Davidson (1985) and Perry and Porter (1985) show that merger between two firms is profitable for these two firms; Werden and Froeb (1998) provide numerical analysis which suggests that this is true even when there can be further entry after merger. In this case merger policy to encourage entry can be both desirable and effective.

Any merger between a set of firms that is profitable must increase price and hence decrease consumer surplus (see Farrell and Shapiro (1990) for the case in which the number of firms is held fixed, and Spector (2003) when entry can occur after merger). In our analysis, this detriment is balanced against the impact of merger policy on entry. The strength of the entry encouragement effect—and the desirability of using merger policy rather than an alternative, such as an entry subsidy—is greater when the entrant's private gain from merger is close to the social benefit of competition. This relationship is affected by market conditions, as follows.

First, with inelastic demand, merging firms capture a higher proportion of the lost consumer surplus, reducing the social cost of encouraging entry. Secondly, the share of merger surplus accruing to the entrant (assumed to be the merger target) is important. This is higher when there is competition for the target, i.e., when there is more than one within-industry bidder. For this reason the argument may be stronger for, say, a three-to-two merger than the duopoly-to-monopoly case.

4.3 Implementation

In this section, we comment briefly on two aspects implementation: should the merger threshold should vary across industries?; and how would a policy-maker determine whether the threshold has been hit or not?

Ideally, the merger threshold should differ according to industry conditions (e.g., the consumer surplus gain from competition) and the characteristics of individual participants (e.g., entrant's bargaining strength, uncertainty over costs or profits). It is impractical for merger rules to be individually tailored for every industry: this would be highly complex, and conflict with the need for clear and predictable rules. Despite this, it should be possible to devise some general rules allowing a degree of leniency towards firms in low profitability states, perhaps

with some variation along the lines of the comparative statics results in the paper.[17]

The tension between setting the optimal policy in each case and the need for general rules is, of course, not unique to merger control. Ideally, the duration and scope of a patent would be set according to the trade-off between R&D incentives and deadweight losses for each innovation; but in practice there is little variation between industries. Similarly, bankruptcy rules would ideally be tailored to the risks and characteristics of each project, but instead common procedures apply. In merger control as in other areas of policy, it is surely preferable to achieve the best outcome on average, even if this falls short of the optimum in particular cases, than to ignore the effect altogether.

On the question of determining whether the threshold has been reached: the proposed policy requires no more evidence than is typically gathered in merger investigations. The merger rule takes the form of a (low) profitability threshold for the target firm below which merger is permitted. In developed economies information on profitability is available from company accounts, and competition authorities have powers to request more detailed data in the course of their investigations. The existing failing firm defence, for example, requires detailed assessment of the firm's profitability and future prospects. What we propose is no more onerous than this.

5 Conclusions

We have argued that merger assessments should take into account the effect of the policy rule on the incentives for entry (and *ex ante* investment decisions in general). A more lenient policy—which could be characterized as extending the existing failing firm defence to ailing as well as imminently failing firms—may yield social benefits through its beneficial impact on entry, resulting in more effective competition in the long run. This paper provides a framework for determining the optimal degree of leniency, which balances the losses from increased post-merger concentration with the gains from greater *ex ante* entry and competition.

This view challenges several of the conclusions that have been reached by policy-makers. In particular, three assumptions underlying policy and/or practice in this area are questioned. The first is that a consumerist policy-maker (e.g., a competition authority) should be the most strict in implementing merger control. By contrast, in this model it is the consumerist

[17] In addition, case law improves clarity and allows for detailed principles to be developed further than is possible in statute.

authority that adopts the most lenient merger rule.

Secondly, the division of the merger surplus is important, but in a way that differs from the view adopted by antitrust authorities in certain cases. In the Detroit newspaper JOA, the (equal) share given to the "failing firm" almost jeopardized merger clearance. In contrast, this paper argues that the entry encouragement effect of more permissive merger policy is greater if the share given to the target firm, where this is also the entrant, is large. Thus policy should be more lenient in such cases.

Thirdly, a target that has greater bargaining power, perhaps because it is a division of a large corporate group, should be treated more, not less, leniently. A stronger target gains a greater share of the merger surplus and its entry decision will be more sensitive to the merger rule. This contradicts the outcome of the ICI–Kemira Oy case, in which a failing division was judged more harshly than may have been the case for a stand-alone firm in a similar financial position.

The proposed merger policy might be criticized as being susceptible to strategic behaviour. Modelling a number of plausible strategies for manipulating the rule, we find that the fundamental argument is not undermined: although the precise conditions may change, the case for leniency stands. Merger policy is not the only possible mechanism for influencing entry. Other approaches, such as an entry subsidy, may also be beneficial; perhaps even more so in some instances. But these alternatives also have their drawbacks, and do not clearly dominate our proposed merger policy.

Appendix: proofs

Proposition 3

The results follow from the partial derivatives of π_M^*:

(a) $sgn(\frac{d\pi_M^*}{dS}) = sgn\Big(B\lambda(1+2B)\Big) > (=)0$ for $\lambda > (=)0$.

(b) $sgn(\frac{d\pi_M^*}{d\delta}) = sgn(\frac{-1}{\delta^2}) < 0$.

(c) $sgn(\frac{d\pi_M^*}{dB}) = sgn\Big(2S(S+\lambda B) - \lambda B^2(2S-\lambda)\Big) \gtrless 0$. This is quadratic in B. The critical value $\widehat{B}$ is the relevant root of this expression.

(d) Substituting $S \equiv \Delta C - \lambda \Delta\pi$ in the expression for π_M^*, we find

$$sgn(\frac{d\pi_M^*}{d\lambda}) = sgn\bigg(- \Delta C(1+2B)\bigg) < 0.$$

Proposition 6

(a) Expected welfare is given by

$$W^{(1)}(\pi_M) = \frac{k_S(\pi_M)}{K}\bigg(S(1+\delta-\delta\pi_M) - \delta^2 B(S - \frac{1}{2}B)\bigg).$$

Evaluating the partial derivative at $\pi_M = 0$, its sign is determined by the sign of $(1+\delta)S(2B-1) - \delta^2 B^2(3S-B)$. The condition $B > \frac{1}{2}$ is necessary, but no longer sufficient; in addition, δ must not be too large. Taking the positive root of the quadratic in δ and substituting $B = bS$, we derive the condition $\delta < \widetilde{\delta}^{(1)} \equiv \frac{1}{X}(1+\sqrt{2X+1})$, where $X \equiv \frac{2B^2(3-b)}{(2B-1)} > 0$.

To demonstrate that the condition is binding, it is necessary to prove that $\widetilde{\delta}^{(1)} \leq 1$. Differentiating $\widetilde{\delta}^{(1)}$ w.r.t. X, we find that the sign of the derivative is determined by $-(X+1+\sqrt{2X+1}) < 0$; thus $\widetilde{\delta}^{(1)}$ is maximized when X is at its minimum. Over permitted parameter values, X is minimized when $B = b = 1$. At this point, $X = 4$ and thus $\widetilde{\delta}^{(1)} = 1$, giving the upper bound on the condition.

(b) The interior solution for welfare maximization is

$$\pi_M^{(1)} = \frac{(1+\delta)(2B-1)}{4\delta B} - \frac{\delta B(3S-B)}{4S}.$$

Substituting for π_M^* and $B = bS$, we can write

$$\pi_M^{(1)} = \pi_M^* - \frac{1}{4}\delta B(3-b).$$

Since $b \leq 1$, it must be the case that $\pi_M^{(1)} < \pi_M^*$: strategic behaviour lowers the optimal merger threshold, implying stricter merger control.

Proposition 7

(a) Expected welfare is given by

$$W^{(2)}(\pi_M) = \frac{k_d(\pi_M)}{K} S\bigg(1 + \delta - \delta(\pi_M + \delta B)\bigg).$$

Evaluating the partial derivative at $\pi_M = 0$, its sign is determined by the sign of $(1 + \delta)(2B - 1) - 3\delta^2 B^2$. The condition $B > \frac{1}{2}$ is necessary, but no longer sufficient; in addition, δ must not be too large. Taking the positive root of the quadratic in δ , we derive the condition $\delta < \widetilde{\delta}^{(2)} \equiv \frac{1}{Y}(1 + \sqrt{2Y + 1})$,where $Y = \frac{6B^2}{(2B-1)} > 0$.

For $b > 0$, $Y > X$ implying that $\widetilde{\delta}^{(2)} < \widetilde{\delta}^{(1)}$ (since the expression is decreasing in its argument, as demonstrated in the proof of Proposition 6). By a method analogous to that used before, it can be shown that the upper bound on $\widetilde{\delta}^{(2)}$ is $\frac{1}{6}(\sqrt{13} + 1) \approx 0.768$, thus the condition is more binding than that in Proposition 6.

(b) The interior solution for welfare maximization is

$$\pi_M^{(2)} = \frac{(1 + \delta)(2B - 1)}{4\delta B} - \frac{3}{4}\delta B = \pi_M^* - \frac{3}{4}\delta B.$$

With $b > 0$, $\pi_M^{(2)} < \pi_M^{(1)} < \pi_M^*$: the wasteful expenditure strategy lowers the optimal merger threshold compared with the price-cutting strategy, implying stricter merger control.

Proposition 9

(a) Expected welfare is given by

$$W_P(\pi_M) = \frac{k_P(\pi_M)}{K} S\bigg(1 + \delta - \delta\pi_M - \frac{1}{2}\delta^2 S(1 - b^2)\bigg).$$

Evaluating the partial derivative at $\pi_M = 0$, its sign is given by the sign of $N = (1 + \delta)(2B - 1) + \delta^2 S^2(1 - b)(1 - 4b - b^2)$. There are two distinct cases, depending on whether $(1 - 4b - b^2) \leq 0$, i.e. for $b \leq \widetilde{b} \equiv \sqrt{5} - 2$.

For $b < \widetilde{b}$, N is positive and leniency is always welfare-increasing. In fact, the condition $B > \frac{1}{2}$ (which is assumed throughout) can be relaxed: for a given b in this range there exists a critical value of $B < \frac{1}{2}$ such that N just remains positive.

For $b > \widetilde{b}$, the condition $B > \frac{1}{2}$ is necessary, but no longer sufficient; in addition, δ must not be too large. Taking the positive root of the quadratic in δ, we derive the condition $\delta < \widetilde{\delta}^P \equiv \frac{1}{Z}(1 + \sqrt{2Z+1})$, where $Z \equiv \frac{2B^2}{(2B-1)}\frac{(1-b)}{b^2}(b^2 + 4b - 1) > 0$. In this case (unlike Propositions 6 and 7) $\widetilde{\delta}^P > 1$ is possible: the lower bound is on Z is zero (as $b \to \widetilde{b}$), and $\widetilde{\delta}^P \to \infty$ as $Z \to 0$. Thus the condition on δ may be non-binding.

(b) The interior solution for welfare maximization is

$$\pi_M^P = \frac{(1+\delta)(2B-1)}{4B\delta} + \frac{1}{4}\delta B\frac{(1-b)}{b^2}(1 - 4b - b^2) = \pi_M^* + \frac{1}{4}\delta B\frac{(1-b)}{b^2}(1 - 4b - b^2).$$

Again, the magnitude of b is important: $\pi_M^P > (<)\pi_M^*$ for $b < (>)\widetilde{b}$.

Proposition 11

With the optimal entry subsidy in place, welfare is given by

$$W(E^*) = \frac{1}{16KR}(1+\delta)^2(2S+R)^2 \equiv W_E^*,$$

while with the optimal merger policy, welfare is given by

$$W(\pi_M^*) = \frac{S}{16KB}(1+\delta)^2(2B+1)^2 \equiv W_M^*.$$

The ratio of welfare using the merger tool to that under the entry subsidy is then

$$\frac{W_M^*}{W_E^*} = \frac{RS(2B+1)^2}{B(2S+R)^2}.$$

The welfare ratio equals unity, implying that the two policies are equally beneficial, when $R = \frac{S}{B}$ or $R = 4BS$. The former is the relevant root over parameter ranges where both policies are desirable (i.e., with $S \geq B > \frac{1}{2}$ and $R < 2S$); with $B > \frac{1}{2}$ the latter implies $R > 2S$. For $R > (<)\frac{S}{B}$ the ratio is greater (less) than unity and the merger tool yields higher (lower) welfare than the entry subsidy.

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