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Corporate Governance and Collusive Behavior*†

Paolo Buccirossi‡ Giancarlo Spagnolo§

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1 Introduction

The optimality of decentralized exchange is guaranteed by the fundamental theorems of welfare economics only in the case of perfect competition. Unfortunately, few real world industries are even somewhat close to the definition of perfect competition. Most industries are oligopolistic, and many of them are subject to sophisticated strategic behavior that may lead firms to curb competition and monopolize markets, that is, to maximize industry profits while reducing social welfare. A sound competition policy is therefore often necessary to avoid the potential social welfare losses linked to collusive behavior. As any other public policy, to be sound, competition policy must be effective: it must be implemented by well informed regulators endowed with sufficient sanctioning power to deter violations. Antitrust authorities need to know which factors signal the presence of, or simply facilitate anticompetitive behavior; and legislators must know how to structure the legal environment in order to obtain competition-enhancing effects at the lowest possible cost.

Corporate governance factors directly shape firms' objectives and choices, and therefore play a crucial role in determining firms' attitudes towards competition and collusion. Corporate governance factors also determine who is the "key player" in a firm's decision to behave anti-competitively, hence

*We are grateful to Patrick Bolton, Massimo Motta, Carlo Scarpa, Yossi Spiegel and, especially, Marco Pagano for detailed and insightful comments that considerably improved the paper. Thanks also to Guido Friebel, Wallace Mullin, Christopher Snyder, Giacinta Cestone, Chiara Fumagalli and participants at the inaugural ACLE Conference in Amsterdam (February 2005) for comments or stimulating discussions. Usual caveats apply. Spagnolo gratefully aknowledges funding from the Swedish Competition Authority.

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the effectiveness of certain sanctions against violations rather than others. In this paper we review the relation between corporate governance and cartel formation, and discuss how corporate governance factors affect the optimal enforcement of antitrust law against cartels in terms of detection, sanctions, and leniency policies.

Section 2 introduces the issue briefly reviewing the current knowledge on the complex relation between corporate governance and product market competition, not focussing only on illegal cartel formation. Section 3 discusses corporate governance practices that are likely to facilitate cartel formation and more generally collusive behavior. Section 4 deals with how antitrust law enforcement against cartels should be adapted in the light of corporate governance issues. Section 5 briefly concludes highlighting the relevance of the discussion for other forms of corporate or organized crime, like corruption, earnings management, and management-auditor collusion. We apologize in advance for the many relevant papers we cannot refer to, as this is not an exhaustive survey of the literature(s) but a discussion of the main issues linking corporate governance, collusive behavior, and antitrust enforcement.

2 Corporate governance and product market competition

For the purposes of this paper corporate governance can be defined as the set of institutional arrangements that keep firms' agency problems under control, leading managers to pursue shareholders' rather than their own goals, and to perform well in general.[1] The relationships between corporate governance and competition is rather complex, but it is a crucial one that goes in both directions.

Competition and corporate governance. Product market competition is typically regarded as the main force that disciplines firms, keeping them "on the tip of the toes", inducing them to adopt efficient practices, including good corporate governance ones, and maximize efficiency.[2] Theoretical work identified a number of channels through which product market competition tends to improve corporate governance and performance, including:

- *Firm selection*: effective competition ensures that a larger fraction of demand is served by the most efficient firms; and above all, the "survival of the fittest", i.e. that less efficient firms tend to be driven out of the market by more efficient incumbents or entrants, ensuring greater efficiency in the long run also in terms of firms' corporate governance practices, where these matter.[3]

[1] For an up to date, in depth elegant treatment see Jean Tirole, The Theory of Corporate Finance, Princeton NJ, Princeton University Press, 2005. Brilliant surveys on the literature on corporate governance are also offered by Andrei Shleifer and Robert Vishny, *A Survey of Corporate Governance*, No. 2, The Journal of Finance, (1997); and by Marco Becht, Patrick Bolton, and Alisa Roell, *Corporate Governance And Control*, NBER Working Paper 9371.

[2] The excellent piece by Franklin Allen and Douglas Gale, *Corporate Governance and Competition,* in Corporate Governance, Theoretical and Empirical Perspectives (Xavier Vives ed. 2000), makes this point very convincingly, besides elegantly reviewing and discussing most previous work on the subject.

[3] A. Alchian, Uncertainty, *Evolution and Economic Theory*, 58 Journal of. Political Economy, 211 (1950).; Jan Boone, *Competitive Pressure: the Effects on Investments in Process and Product Innovation*, 31(3) Rand Journal of Economics 549, (2000); Philippe Aghion and Mark Schankerman,*On the Welfare Effects and Political Economy of*

- *The exit threat for managers*: forcing all firm managers to work hard to avoid losing their job, either when their firm is driven into bankruptcy by competitors[4], or because it is bought on the market for corporate control;[5]

- *Relative performance evaluation*: the presence of competitors allows for comparisons between competing firms' and their managers' performance, sharpening incentives through yardstick competition and eliciting higher managerial effort;[6]

- *Rents reduction:* intense product market competition reduces firms' profit, free cash flow and corporate rents in general, reducing the "temptation" for managerial misbehavior;[7] if competition keeps firms "lean and hungry" there is little that opportunistic managers can embezzle or waste, and the corporate governance problem is directly reduced.

Still, economic theory cannot offer unambiguous predictions on the general relation between product market competition and firm performance, because: i) as first noted by Schumpeter, small market shares and lack of market power may reduce incentives to invest in search for productivity-enhancing innovation;[8] and ii) when strong competition substantially increases the likelihood of bankruptcy, managers' incentive to exert effort may decrease.[9] Note, however, that these negative effects are likely to matter when there is very tough competition, and not to be relevant from a cartel deterrence perspective, as cartels may completely hinder product market competition.

Empirical evidence, on the other hand, shows a positive effect of product market competition on firm performance and innovation. Several firm-level studies found evidence of positive effects of product market competition on productivity performance.[10] Other studies found that product market

Competition-Enhancing Policies, 114(Oct) The Economic Journal 804 (2004).

[4] See e.g. Oliver D. Hart, *The Market Mechanism as an Incentive Scheme*,14(2) Bell Journal of Economics, 366 (1983); Klaus Schmidt, *Managerial Incentives and Product Market Competition*, 64 Review of Economic Studies,191 (1997); and Michael Raith, Competition, Risk and Managerial Incentives, 93 *American Economic Review*, 1425 (2003).

[5] Competition on the market for corporate control is a relatively novel phenomenon that, when present, may reinforce or substitute for product market competition. See e.g. H.G. Manne, *Mergers and the Market for Corporate Control*, 73 Journal of Political Economy 110 (1965).

[6] See Barry Nalebuff and Joseph Stiglitz, *Information, Competition and Markets,* 73(2) American Economic Review, 278 (1983) and Oliver D. Hart, *The Market Mechanism as an Incentive Scheme*,14(2) Bell Journal of Economics, 366 (1983); Andrei Shleifer, *A Theory of Yardstick Competition*,16(3) RAND Journal of Economics, 319(1985).

[7] Michael Jensen, *Agency Costs of Free Cash Flow, Corporate Finance*, and Takeovers, 76 American Economic Review 76, 323 (1986); Xavier Vives, *Corporate Governance: Does it Matter?*, in Corporate Governance, Theoretical and Empirical Perspectives (Xavier Vives ed. 2000).

[8] See: Philippe Aghion and Peter Howitt, *A Schumpeterian Perspective on Growth and Competition*, in Advances in Economics and Econometrics, 2 Theory and Applications, (David M. Kreps and Kruskal F. Wallis, eds., Cambridge University Press eds 1997); Daron Acemoglu and Joshua Linn, *Market Size in Innovation: Theory and Evidence from the Pharmaceutical Industry*, 119(3) Quarterly Journal of Economics, 1049 (2004); Xavier Vives, *Innovation and Competitive Pressure*, CEPR Dp No. 4369, (2004).

[9] See e.g. Klaus Schmidt, *Managerial Incentives and Product Market Competition*, 64 Review of Economic Studies,191 (1997).

[10] Martin Baily, Hans Gersbach, *Efficiency in Manufacturing and the Need for Global Competition*, 1 Brookings Papers on Economic Activity - Microeconomics, 307(1995); Stephen J.Nickell, *Competition and Corporate Performance*, 104 Journal of Political Economy, 724(1996) and Richard Blundell, R. Griffith, and J. Van Reenen, *Market Share, Market Value and Innovation in a Panel of British Manufacturing Firms*, 66 Review of Economic Studies, 529 (1999), among others.

competition and good corporate governance (financial pressure) both improve firms' performance in terms of productivity growth, that the two forces tend to be substitutes but that the former one has a stronger effect.[11] However, these two forces are potential substitutes only from a productivity point of view. From a general welfare point of view, we know that in most cases the lack of competition will tend to raise prices, reduce output, and harm consumers. Finally, more recent studies find an inverted–U shaped relation between competition and innovation: at low levels of product market competition an increase in competition foster innovation, while at already high levels of competition a further increase hinders innovation.[12] From our antitrust perspective the interesting part of the parameter space is where cartels may substantially reduce competition, i.e. the first part of the inverted-U relationship; and there competition unambiguously increases innovation and performance.

Corporate governance and competition. As mentioned above, corporate governance variables may also, in return, influence the degree of competition in a product market.

Firms' behavior is determined by the objective function of those who control them. In the real world many interacting factors determine the final shape of firm controllers' objective function, thereby determining preferences towards more or less competitive behavior. The most important among these factors are the central elements of corporate governance: managerial incentives, ownership, and debt structure. For example, the managerial theories of the firm stressed early that, when ownership is separated from control, firms tend to pursue objectives different from profit-maximization.[13] Seminal contributions in the last decades showed that, with limited liability, debt may directly affect the intensity of oligopolistic competition;[14] and that financial constraints linked to credit market imperfections may lure more liquid rivals into predatory strategies, as suggested by the 'deep pockets' argument.[15]

More recent work has highlighted how poor corporate governance arrangements or rules may reduce competition by establishing *financial barriers to entry* in product markets. It has been shown that financial intermediaries with substantial monopoly power have incentives and instruments to restrict

[11] See in particular Stephen Nickell, *What Makes Firms Perform Well?,* 41(3-5) European Economic Review, 783 (1997): Januszewski, S.I.; Kolke, F.J., and Winter, J.K., *Product market competition, corporate governance and firm performance: An empirical analysis for Germany*, 56(3), Research in Economics, 299 (2002) confirm the strong effect of product market competition on German firms productivity improvements, but find no effect of corporate governance variables. Comparable results are found for transition and developing economies by Grosfeld, I. and T. Tressel, *Competition and Corporate Governance:Substitutes or Complements? Evidence from the Warsaw Stock Exchange*, 10(3) Economic of Transition (2002); and various papers in the November 2003 issue of the Economic Journal.

[12] Philippe Aghion, Nicholas Bloom, Richard Blundell, Rachel Griffith, Peter Howitt, *Competition and Innovation: An Inverted-U Relationship*, IFS Working Paper 0204 (2002).

[13] For example,William Baumol, *On the Theory of Oligopoly*, 25 Economica, 187 (1958); R.M Cyert, J.G.March, A Behavioral Theory of the Firm, Prentice-Hall, Engelwood Cliffs, NJ (1963); Rober Marris, The Economic Theory of Managerial Capitalism, Macmillan,NewYork (1964); Herbert Simon, Administrative Behavior, (2nd ed.), New York: Macmillan (1957); Oliver Williamson, Managerial Discretion and Business Behavior, Engelwood Cliffs, N.J.: Prentice-Hall (1964); Michael Jensen, and William Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, 3 Journal of Financial Economics, 305 (1976).

[14] James Brander, and Tracy Lewis, *Oligopoly and Financial Structure: The Limited Liability Effect*, 76(5) American Economic Review , 956 (1986)

[15] See e.g. Patrick Bolton and David Sharfstein, *A Theory of Predation Based on Agency Problems in Financial Contracting,* 80 American Economic Review 93 (1990).

entry in downstream product markets of potential competitors of their borrowers;[16] that agency costs in the equity and debt markets may interact to reduce financially constrained entrepreneurs' ability to start new firms, increasing concentration and reducing competition in product markets;[17] and that deep-pocket incumbents may lobby to maintain poor corporate governance rules that amplify agency problems in financial markets and protect their incumbency rents from potential entrants.[18]

What matters most for this chapter, are the effects that corporate governance rules and practices have on firms' ability to form and sustain tacit or explicit *horizontal collusive agreements* that restrict competition. This is the subject of the next section.

3 Corporate governance and cartel formation

It is well known that contracts with third parties may have important strategic effects, and corporate governance variables, like managerial incentive schemes and financial arrangements, are contracts with third parties from the point of view of competitors.[19] There is a considerable amount of empirical evidence on both managerial incentives, ownership, and debt structures. In this section we briefly discuss the empirically observed corporate governance arrangements that are likely to facilitate cartel formation and maintenance.

3.1 Managerial incentives, stock options, and collusion

Managerial incentives. Several empirical studies of managerial compensation were made in the '80s, but the empirical literature on managerial incentives exploded in the nineties.[20] To understand how

[16] See Sudipto Battacharya and Gabriella Chiesa, Proprietary Information, Financial Intermediation and Research Incentives", 4 *Journal of Financial Intermediation*, 328 (1995); Thomas Hellmand and Marco Da Rin, *Banks as Catalysts for Industrialization*, 11 Journal of Financial Intermediation, 366 (2002); and, in particular, Giacinta Cestone and Lucy White, *Anti-Competitive Financial Contracting: The Design of Financial Claims*, 58 Journal of Finance, 2109 (2003). Robust supporting evidence is in Nicola Cetorelli and Philipp Strahan, *Finance as a Barrier to Entry: Bank Competition and Industry Structure in Local U.S. Markets*, forthcoming in the Journal of Finance.

[17] Paolo Fulghieri and Matti Suominen, *Does Bad Corporate Governance Lead to Too Little Competition?*, manuscript, 2005.

[18] See e.g. Enrico Perotti and Paolo Volpin, *Lobbying on Entry*, manuscript, (2005); Marco Pagano and Paolo Volpin, *Shareholder Protecrtion, Stock Market Development, and Politics*, Journal of the European Economic Association, forthcoming (2006). Raghuran Rajan and Lugi Zingales, *The Great Reversals: The Politics of Financial Development in the 20th Century*, 69 Journal of Financial Economics, 5 (2003), confirm the importace of this effect showing that over the last century investor protection correlates with trade openness: this suggests that import liberalization, by dissipating incumbents' rents anyway, reduces their hostility to better investor protection and paves the way to financial development. See also Abiad, A., and A. Mody, *Financial Reform: What Shakes It? What Shapes It?*, 95 American Economic Review 95, 66 (2005).

[19] Thomas Schelling, The Strategy of Conflict, Oxford: Oxford University Press. (1960) provides an insightful although informal analysis. Steffen Lippert and Giancarlo Spagnolo, *Networks of Relations and Social Capital*, CEPR Dp. No. 5078 (2005) recently showed that Schelling's insight also applies to implicit or relational contracts sustained by repeated interaction, like long-term supply relationships.

[20] After the publication Michael Jensen and Kevin Murphy, *Performance Pay and Top-Management Incentives*, 98 Journal of Political Economy 225 (1990), with the provocative thesis that CEO's compensation contracts had little incentive power. See Kevin Murphy, *Executive Compensation*, in Orley Ashenfelter and David Card (eds.), Handbook of Labor Economics, North Holland, for an excellent survey.

the objectives of real world top managers determine firms' competitive attitudes, one can introduces top managers' incentives schemes, bonus contracts as observed in empirical studies, in a supergame-theoretic model of dynamic competition.[21] The analysis shows that when managers have a preference for smooth time-paths of profits – as revealed by the empirical evidence on earnings management and "income smoothing" – and when they are under capped incentive contracts, like the common "bonus plans" or termination contracts with substantial incumbency rents, manager-led firms can sustain collusive agreements much more easily than profit-maximizing ones. This finding of course leads to a related/complementary question: Do stock-based incentives, like stock options, induce a more competitive attitude in managers, so that concerns about tacit collusion and social welfare can be reduced? To answer properly this question one should keep focus on stock-based compensation plans as commonly designed in the real world: relatively liquid plans awarding stock-based bonuses vesting in a number (typically four) of consecutive years, after which a new plan is established.[22] This kind of incentives can also be introduced in a classical model of repeated oligopoly to evaluate their effects on collusive behavior.[23] It turns out that as long as the stock market has perfect foresight, some dividends are distributed, and incentives are paid more than once or are deferred, compensation packages related to stock price also greatly facilitate collusion. The reason is that stock-related incentives link managers' *present* compensation to the stock market's expectations about the firms' *future* profitability. When a breach from a tacit collusive agreement occurs and is detected by competitors, the stock market anticipates the negative effect of the breach on firms' future profitability linked to the forthcoming competitive/price war phase, and immediately discounts it on the stock price, reducing managers' short-run gains from any deviation.[24] When stock-based incentives are deferred, the first pro-collusive effect is reinforced by the fact that the already limited beneficial effect of short-run gains from deviation on the stock price may be completely passed at the time the manager receives the bonus. Delegation of control to managers under deferred stock-related compensation allows owners to support the joint monopoly collusive agreement at any level of the discount factor. Note that this is the case independently of whether managerial contracts are short or long term.

Stock options, short-termism, governance, and collusion. In the two decades before the burst of the stock market bubble, the level and pay-performance sensitivity of top managers' compensation increased enormously - particularly in the U.S. - because of a wave of adoption of stock-related incentives, such as stock options plans.[25] Stock options are now regarded by many observers as one of the main causes behind the many recent episodes of corporate fraud and earnings manipulation,

[21] See Giancarlo Spagnolo Spagnolo, *Managerial Incentives and Collusive Behavior*, 49(6) European Economic Review, 1501-1523.(2005)

[22] Stacey R. Kole, T*he Complexity of Compensation Contracts*, 43 Journal of Financial Economics 79 (1997).

[23] Giancarlo Spagnolo, *Stock-Related Compensation and Product-Market Competition*, 31(1) RAND Journal of Economics , 22-44 (2000).

[24] In addition, a defection from a cartel could signal declining future industry profits to an imperfectly informed stock market, as it is well known that cartels are harder to sustain hence defections more frequent in declining industries. This would further depress the stock price and reinforce the pro-collusive effect of stock-related compensation (thanks to Patrick Bolton who let us note this additional effect).

[25] Brian Hall, and Jeffrey Liebman, *Are CEOs Really Paid Like Bureaucrats?* 113(2) Quarterly Journal of Economics, 653 (1998).

including Enron and WorldCom. A lively debate among financial economists and legal experts is trying to clarify how and why the increase in stock-based compensation led to so widespread managerial misbehavior.[26]

The result mentioned earlier – that stock-related compensation, as awarded in reality, may strongly stabilize cartels – appears puzzling if contrasted to this parallel literature on stock based managerial compensation. In this literature everybody seems to agree on at least one point: stock-options induced managerial "short-termism", i.e. led managers to focus excessively on short-term results, hindering and illegally hiding firms' long-term performance for the benefit of current shareholder and at the expense of future ones. A remedy to the problem - commonly suggested by different observers that disagree on its causes – is further delaying the vesting of stock options.[27]

But if the main fault of stock-options was that of inducing excessive managerial short-termism, one might have expected that it had at least the positive effect of destabilizing cartels by increasing managers' evaluation of short-term gains from unilaterally defecting from agreed collusive strategies relative to future long-term losses from the price wars triggered by defections once detected by partner cartel members. How can stock-options give managers a short-term perspective in terms of financial performance and a long-term one in terms of collusive behavior?

There are at least two answers to this question. The first immediate one is that a time span of, say, five years, is often considered short-term for a firm's financial performance, but is a very long term for cartels, whose average estimated total duration is about five years.[28] Therefore, the "short-termism" discussed in the recent corporate finance literature is not of a type that could seriously hinder the pro-collusive effect of stock-related compensation discussed above.

The second, more fundamental answer to the above question is that to positively affect the stock price and CEO compensation, the exceptional earnings from a secret price cut, or from any other

[26] See e.g. Oren Bar-Gill, Lucian Arye Bebchuk, *Misreporting Corporate Performance,* Discussion Paper No. 400, Harvard Law School, (2002/3) ; Lucian Bebchuck, Jesse Fried, *Pay* Without Performance: the Unfulfilled Promise of Executive Compensation, Cambridge, Harvard University Press (2004); Patrick Bolton, Josè Scheinkman, Wei Xiong, *Executive Compensation and Short-Termist Behavior in Speculative Markets*, N.B.E.R. Working Paper No. W9722 (2003); Patrick Bolton, Josè Scheinkman and Wei Xiong, *Pay for Short-Term Performance: Executive Compensation in Speculative Markets*, manuscript, Princeton University (2005).

[27] This remedy may not be sufficient though. Even if options are vested two or three years later, after fifteen years of incumbency a CEO will have accumulated such an amount of liquid shares that current short term trading possibilities will dominate on stock-options vesting in the future in determining his objectives and behavior. And even without stock options, as long as a wealthy CEO can secretly buy and sell his firm's shares, the incentive to manage reports and earnings remains high. The only (partial) solution to the problem of stock market driven managerial misbehavior, apart from tougher legal sanctions and whistleblower schemes (see Paolo Buccirossi, Giuliana Palumbo and Giancarlo Spagnolo, *Whistleblowers and Financial Fraud,* manuscript, 2005), is the complete prohibition to trade the stock of a company (or an industry) one works or has worked for in the previous X years. All stock-related compensation could be put in a fund that cannot be liquidated before X years after having stop working for that firm in any form. This may cost in terms of risk sharing, but gives better incentives to CEOs to choose policies, good followers, and good board of directors, and eliminates the insider trading problem that leads to misreporting, protecting naive or "too busy to monitor" investors.

[28] Connor, John.M., *Private International Cartels: Effectiveness, Welfare, and Anticartel Enforcement*, Purdue Agricultural Economics Working Paper No. 03-12 (2003); Margaret C. Levenstein and Valerie Y Suslow, *What Determines Cartel Success?*, University of Michigan Business School Working Paper No. 02-001 (2002)

unilateral defection from agreed collusive strategies, must be publicly disclosed. And while it typically takes time for the many dispersed investors to fully update expectations and incorporate the effect of the exceptional reported earnings in the stock price[29], the increase in reported income and sales can readily be observed by suspicious partner cartelists who can react with a price war, driving down the stock price (origin and effects of price wars are very well understood by media and markets, and attract investigations from competition authorities[30]).

To conclude:

- The separation of ownership and control with managers under the most commonly observed managerial incentive contracts - bonus contracts and stock options - appear to substantially facilitate tacit collusion among firms. "High powered" stock-based incentives as usually designed, besides being probably at the root of the many recent episodes of earnings management and corporate mismanagement, are no guarantee of competitive behavior; on the contrary, they also tend to facilitate collusive behavior.

3.2 Cross-ownership, pyramids, and networks

Passive investments and competition. Firms or firm owners may acquire rivals' stock that grant them the right to part of rivals' profits. If, by doing so, they gain (possibly joint) control over the other company, a merger arises that will (at least should) be subject to antitrust scrutiny. However, in several cases a partial cross-ownership arrangement is a mere "passive investment" in that it does not alter the control structure of the companies involved.[31] Nonetheless, such silent financial interest may affect firms' market conduct so as to lead to a less competitive outcome. Formal analysis of a static Cournot game,[32] where firms sell substitute products, shows that any modification of the ownership structure, such that a firm's controller raises his interest in a rival firm, reduces the equilibrium market output. In the limit, n firms can secure themselves the monopoly profit, without any collusive agreement, if each controller owns $1/n$ of all competing firms. The intuition for these results is straightforward. A partial cross-ownership arrangement changes players' payoff functions. A firm's controller payoff with a financial interest in a rival depends also on the level of profits gained by the latter. Any decision that has a negative impact on the rival's profit (such as increasing output) will be carried out up to the point where the marginal gain stemming from its own profits equals the marginal loss stemming from the reduction of profits of the competing firm. If controllers do not hold financial interests in rival

[29] See Huberman, G. and T. Regev, *Contagious Speculation and a Cure for Cancer: a non-event that made Prices Soar*,56 Journal of Finance, 387 (2001) for a nice example of how slow the stock-market can react to important news.about possible future earnings.

[30] Laing, J.R., 1997, Big Mac Wednesday. McDonald's Price War Battle Plan Casts a Pall Over Fast-Food Stocks, Barron's, March 3, 14.

[31] Examples of such passive investments are Microsoft's acquisition of non-voting stock of Apple and Northwest Airlines' acquisition of 14% of the common stock of Continental Airlines. For a discussion of these and several other cases see David Gilo, *The Anticompetitive Effect of Passive Investment*, Michigan Law Review, 99 (2000).

[32] See Reynolds R. and B. Snapp, *The Competitive Effects of Partial Equity Interests and Joint Ventures*, 4 International Journal of Industrial Organization, 141 (1986).

firms the latter value is always zero. With completely separate ownership, competitive strategies entail private negative effects that are external. The acquisition of a financial interest partially internalizes the external effects of aggressive competitive strategies. If all controllers have an equal share of the profits of all firms in the market, the consequences of their market decisions are fully internalized and the monopoly outcome prevails.[33] This result is robust to different model specifications.[34] However, it would be wrong to conclude that passive investments have *always* harmful consequences so as to warrant a *per se* antitrust prohibition. Like mergers, in some cases they are motivated by different reasons than lessening competition, since long-term partial ownership arrangements may be useful in aligning the incentives of firms involved in alliances or joint ventures when these projects require ex ante relationship-specific investments. Corporate equity ownership stakes, together with product market relationships in R&D-intensive industries, may lead to improvements in operating performance and substantial increase in investment expenditures by target firms.[35]

Most of the formal literature on cross-ownership has focused on static games. Very few models study the impact of cross-ownership on the sustainability of a collusive equilibrium in infinitely repeated games.[36] In a repeated Cournot game the ability of passive investments to generate collusive effects is ambiguous.[37] This ambiguity stems from the fact that partial ownership reduces the incentive to deviate from a collusive agreement, as the deviating firm bears part of the costs imposed on rivals; but it also soften market competition, reducing the severity of punishment when this consists in abandoning collusion and returning to competition, as is often the case in practice.

If we consider a market with homogeneous products and homogeneous good Bertrand competition, crisper results emerge.[38] The acquisition by a *firm* of some shares of a competitor never hinders collusion and in fact relaxes the incentive constraint for the acquiring firm and for all the firms with a direct or indirect interest in the acquiring firm. This model also shows that such ownership arrangements affect the ability of firms to collude only if they lower the critical discount factor of the firm with the highest incentive to deviate, that is the industry maverick. Competition authorities are often suspicious if an industry leader gains controls over a maverick, as this may render collusion more likely. However, when an investment is passive so that the acquirer cannot directly influence the

[33] These results are still valid to a large extent if the passive investment in rivals is made by other firms rather than other firms' controllers. The distinction between the two arrangements is discussed in Paolo Buccirossi, *Facilitating Practices*, in Bucirossi P. (Ed.) Handbook of antitrust Economics, Cambridge, The MIT Press, (2007).

[34] See Friedel Bolle and Werner Güth, *Competition Among Mutually Dependent Sellers*,148 Journal of Institutional and Theoretical Economics 209 (1992); Flath D. , *When is it Rational for Firms to Acquire Silent Interests in Rivals?*, 9 International Journal of Industrial Organization, 573 (1991); Flath D., *Horizontal Shareholding Interlocks*, 13 Managerial and Decision Economics, 75 (1992); David Reitman, *Partial Ownership Arrangements and the Potential for Collusion*,42 Journal of Industrial Economics 313 (1994); Dietzenbacher E., B. Smid, and B. Volkerink , *Horizontal Integration in the Dutch Financial Sector*, 18 International Journal of Industrial Organization, 1223 (2000).

[35] See Jeffrey Allen and Gordon M. Phillips, *Corporate Equity Ownership, Strategic Alliances and Product Market Relationships*, 55 Journal of Finance 2791 (2000), for an empirical research showing that partial ownership arrangements might be useful to consolidate other market relationships which require specific investments.

[36] See Malueg, D. A. *Collusive behavior and partial ownership of rivals*, 10 International Journal of Industrial Organization, 27 (1992) and David Gilo,Yossi Moshe and Yossi Spiegel, *Partial Cross Ownership and Tacit Collusion,* Rand Journal of Economics, forthcoming,(2005).

[37] This result is obtained by Maleug, supra note.

[38] Gilo et al, supra note have developed this model.

decisions of the target firm, and only the incentives of the parties in the transaction are modified, the risk of coordinated effect arises if the role of the maverick in the transaction is reversed, i.e. if it is the maverick that invests in some competitors. If the maverick does not hold equity interests in rivals his incentive to deviate is not changed by other share transactions in the industry.

Interlocking directorates and pyramids. Cross shareholding may be coupled with cross-board membership, giving rise to interlocking directorates that create strong potential for coordinated anti-competitive practices. One of the main effects of this practice is to improve the flow of information between firms, either about future plans or about past conducts. Both types of information may have harmful collusive effects or benign competitive effects. Improved knowledge of rivals' intentions, even when it stems from cheap talks that do not affect payoffs directly, may significantly help firms in solving the coordination problem of reaching a collusive equilibrium.[39] Better and swifter knowledge of firms' conduct helps firms in monitoring each other, facilitating the enforcement of a collusive scheme.[40] However the same practice may improve contracting relationships.[41] Moreover, information sharing in oligopoly may reduce market uncertainty so as to improve business decisions and, in some circumstances, increase welfare.[42] Of course, the collusive risks are much higher if cross-ownership and the related phenomenon of interlocking directorates concern horizontal competitors, and these concerns led to the prohibition of interlocking directorates between competing firms in Section 8 of the Clayton Act. Vertically related firms are more likely to pursue efficiency goals through such arrangements, as they cannot use information to retaliate against a deviator, but can employ it to improve their contractual relationships. However, we must recognize that there are situations in which a nexus of vertical arrangements may have relevant horizontal effects. Indeed, pyramidal ownership structures may determine indirect cross-ownership and control, completely hiding its presence.[43] Whether this has implication for market competition is a subject not yet investigated. Nonetheless, it is evident that pyramidal ownership arrangements pose several problems for a rigorous competition policy. First,

[39] Joseph Farrell and Matthew Rabin, *Cheap Talk*, 10 Journal of Economic Perspectives, 103 (1996) provide a non technical survey of games with cheap talk. The implications for competition policy of information sharing arrangements and of different forms of direct communication among firms are discussed by Karl-Uwe Kühn, *Fighting Collusion by Regulating Communication between Firms*, Economic Policy 169 (2001).

[40] See Xavier Vives, Oligopoly pricing: old ideas and new tools, MIT Press (1999); Kai-Uwe Kühn and X. Vives, I*nformation Exchanges among Firms ant their Impact on Competition*, Office for Official Publications of the European Community, Luxemburg (1995).

[41] See Schoorman, F., Bazerman, M., Atkin, R**.,** I*nterlocking directorates: A strategy for reducing environmental uncertainty*, 6 Academy of Management Review, 243 (1981)

[42] A statement of general validity on the welfare properties of information sharing in oligopoly is not possible, as the outcome depends (in a rather complex way) on the mode of competition (price versus quantity), the type of uncertainty (demand versus costs) and on whether firms' strategies are complements or substitute. On this see Xavier Vives, *Duopoly information equilibrium: Cournot and Bertrand*, 34(1) Journal of Economic Theory 71 (1984); Esther Gal-Or, *Information Sharing in Oligopoly*, 53 Econometrica 329 (1985); Esther Gal-Or, *Information Transmission - Cournot and Bertrand Equilibria*, 53 Review of Economic Studies 85 (1986).; Li (1985), Shapiro (1986); Sakai Yasuhiro, *Cournot and Bertrand Equilibria under Imperfect Information*, 46 Journal of Economics 213 (1986); Alison J. Kirby, *Trade Associations as Information Exchange Mechanisms*, 19 RAND Journal of Economics, 138 (1998); and Raith (1996) that generalizes the previous literature.

[43] La Porta R., *Corporate Ownership Around the World*, (with F. López-de-Silanes, and A. Shleifer), Journal of Finance, (April 1999) document the large diffusion of this ownership structure especially in those countries with weak legal protection of minority shareholders.

they hinder a straightforward application of merger regulation in which the notion of control plays a central role. Second, they may create less competitive environments leading to less efficient market equilibria. Third they can facilitate collusion providing more aligned incentives, improving monitoring and increasing the scope for punishing cheaters.

Debtholders, stakeholders, and other pro-collusive relationships. Powerful "informed lenders" often exert control on their borrowers, place a man of theirs on borrowing firms' boards to be informed of their long term strategies, and possibly coordinate them as it was usual at the turn of the century.[44] This suggests that most of what we wrote earlier about passive and controlling investments in rivals, pyramids, and interlocking directors may also apply to concentrated debt stakes in the hands of third parties, like banks or funds. Indeed, although the implication of the most established theories on the effects of financial structure on product market competition – the "long purse" or "predation" theory, and the "limited liability" theory – is that debt should lead either the leveraged firms or their competitors to behave more aggressively, empirical work has shown that in concentrated industries high leverage tends to have anti-competitive effects on product markets.[45]

An explanation recently advanced for this evidence is based precisely on the interaction between capital structure, managerial incentives, and firms' ability to form and sustain cartels.[46] If shareholders can commit against strategic default by hiring a manager with a valuable reputation - with much to lose from bankruptcy - bank debt may end up enhancing a firm's ability to 'behave prudently' and collude in product markets. Analogous commitments to debtholder-friendly behavior through commonly observed bonus schemes have even stronger pro-collusive effects, that add to the effect of managers' reputation. Common or 'allied' lenders can increase their rents by controlling the choice of managers and their incentives in downstream oligopolies. They can make the choice of 'prudent' managers credible. A very similar pro-collusive effect may obtain through other common or related

[44] See: Bradford De Long, *Did J. P. Morgan's Men Add Value?: An Economist's Perspective on Financial Capitalism, 1991* (in Peter Temin, ed., Inside the Business Enterprise: Historical Perspectives on the Use of Information Chicago, IL: University of Chicago Press for NBER, 205-36); Cantillo Simon, Miguel, T*he Rise and Fall of Bank Control in the United States: 1890-1939*, 88(5) American Economic Review , 1077 (1998), demonstrates that at the time of "financial capitalism" JP Morgan men on railways boards did coordinate them determining substantial collusive extra profits.

[45] See: Judith Chevalier, *Capital Structure and Product Market Competition: Empirical Evidence from the Supermarket Industry*, 85(3) American Economic Review (1995), 415-35. Gordon Phillips, *Increased Debt and Industry Product Markets: and Empirical Analysis*, 37 Journal of Financial Economics (1995), 189-238. Dan Kovenock and Gordon Phillips, *Capital Structure and Product Market Rivalry: How do we Reconcile Theory and Evidence*, 85(2) American Economic Review (1995), 403-408 and *Capital Structure and Product Market Behavior: An Examination of Plant Exit and Investment Decisions*, 10(3) Review of Financial Studies 10(3), (1997) 767-803. Nicola Cetorelli, *Does Bank Concentration Lead to Concentration in Industrial Sectors?*, Federal Reserve Bank of Chicago Working Paper 2001-01.

[46] See Giancarlo Spagnolo, *Debt as a Credible Collusive Device*, Stockholm School of Economics Working Paper in Economics and Finance (2001). Vojislav Maksimovic, *Capital Structure in Repeated Oligopolies*, 19, *RAND Journal of Economics* 389-407 (1988) first addressed the relation between leverage and collusion, showing that debt may hinder collusion by allowing firm owners to defect from the collusive agreement and leave the firm bankupt in the middle of a price war to debtholders. Spagnolo (2001) builds on that model introducing managers and relations between lenders, and reverts the original result showing how powerful lenders that exert some control on borrowers can and have the incentives to coordinate them and monopolize downstream industries.

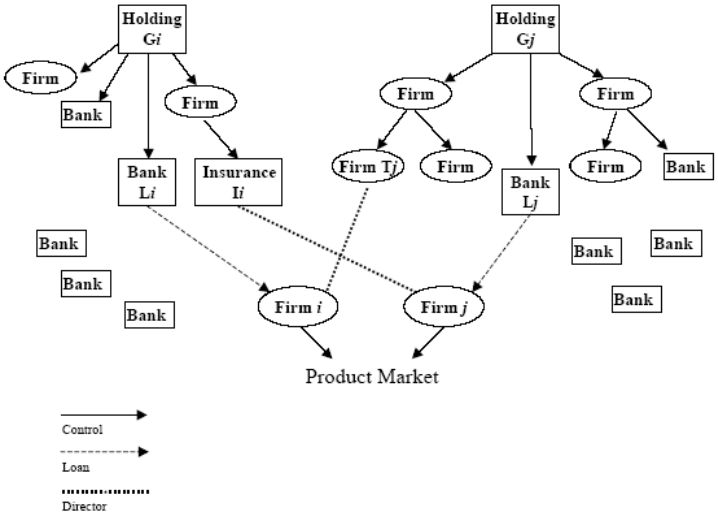

Figure 1:

stakeholders, such as industry-wide trade unions.[47]

Even when credit markets are competitive and firms have multiple lenders, by choosing at least one common lender — or a common set of "allied" lenders — oligopolistic firms can credibly commit to form and sustain collusive agreements that would not be feasible otherwise. When no lender is in common, independent lenders may still be able to monopolize otherwise competitive downstream product markets by having "a man of theirs" on the board of the firms they are not financing; i.e. through information networks composed of indirectly interlocking directors, each monitoring the borrowers of the competing banks, as shown in figure 1. These links through lenders may be hard to identify, because they also may go through *pyramidal* debt structures which are not subject to merger regulation's disclosure rules. Collusive networks of the kind depicted in figure 1 may obtain with links of very different nature than interlocking directors, ownership, or debt relationships: informal long-term collaborative relationships of any kind, including supply relationships in intermediate goods markets, can indirectly link apparently unrelated firms or CEOs.[48] Multiproduct firms at different levels of the production chain, meeting in different input, geographical, or product markets, may form connected networks of relationships that facilitate coordination and enforce collusion between apparently unrelated competing firms by creating pro-collusive *indirect multimarket contact* where no direct multimarket contact appears present.

[47] See again Spagnolo (2001), supra Note 44, and Paul Heidues, *Employers' Associations, Industry-wide Unions, and Competition,* Discussion Paper FS IV 00-11, Wissenschaftszentrum Berlin, (2000).

[48] See Steffen Lippert and Giancarlo Spagnolo, *Networks of Relations and Social Capital*, CEPR Dp. No. 5078 (2005)

To conclude:

- Forms of partial (joint) or pyramidal ownership and debt arrangements, directly or indirectly interlocking directors, and other closed networks of relationships, are likely to facilitate anticompetitive behavior and should be seen as signals of its probable presence by antitrust authorities.
- While they may lead to both unilateral and coordinated anticompetitive effects, these arrangements may also serve the goal of protecting specific investments from opportunistic behavior, especially in R&D-intensive industries. Therefore, their most appropriate antitrust treatment is akin to that of mergers.

4 Corporate governance and antitrust law enforcement

A popular motto states "corporations don't misbehave, people do", and people make their decisions on the basis of their preferences and incentives. The latter are largely determined by the contractual arrangements that shape principal-agent relationships within the firm. Therefore, law enforcement against cartels and other forms of corporate crime raises several issues related to corporate governance. They hinge on two fundamental and interwined questions: who should be liable for antitrust infringement? who should monitor agents' behavior? In this section we present the answers provided by the law and economics literature so far, and discuss how the recent introduction of leniency and whistleblower programs may affect them.

Corporate and individual liability. One of the main differences between European and US antitrust laws is that in the EU "normally"[49] only firms are held liable for violations of antitrust provisions, whereas in the US also individual managers are subject to personal criminal sanctions. This poses the question why we should have joint firm-employee liability and - if it is not necessary - who between firms and individuals should be subject to publicly enforced sanctions. The modern economic analysis of public enforcement against individual crimes, started by the seminal contribution of Becker,[50] identifies a simple rule that calls for the imposition of an expected sanction equal to the harm caused by the wrongful act. This sanction maximizes social welfare as it discourages only inefficient crimes. The transposition of the Becker rule in the antitrust setting needs several adjustments. In the case of individual crimes the same subject decides whether to commit the crime or not and enjoys the benefits of his/her conduct. On the contrary, corporate wrongful acts typically stem from principal-agent relationships in which both the principal and the agent have to make relevant decisions and both, to some extent, benefit from their own and other's decisions. The question then becomes how to impose sanctions that target those who benefit from the illicit conduct, and how to build the enforcement system so to direct penalties toward the subjects who have the actual responsibility for deciding firm's conduct. The answer to both questions depends on several factors: first, the level of

[49] Some national legislations (e.g. UK, Ireland) provide for criminal sanctions also against individuals who breach anticartel provisions. Moreover, for some forms of collusion, such as bidd rigging in public procurement auctions, corporate liability is coupled with individual criminal sanctions in most European jurisdictions.

[50] Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 Journal of Political Economy,169 (1968)

the optimal fine; second, the maximum fine that can be imposed, that, in turn, depends on subjects' ability to pay; and, third, the way principals and agents may discipline their relationship.

If we assume that: (1) the level of the fine is such that a firm as a whole is better off if it behaves legally, (2) there are no insolvency concerns, and (3) through compensation contracts and/or indemnification managers and other stakeholders can allocate the burden of the sanction among themselves as they wish, then the choice between individual and corporate liability is irrelevant. However, if one or more of these assumptions is violated, the optimal public enforcement of anticartel norms may need both individual and corporate liability.

For simplicity, let us assume that cartels are always inefficient as the harm (consumer and deadweight loss) always exceeds the collusive extraprofits[51], and therefore that the level of the sanctions should be such to prevent any cartel formation. According to the prevailing literature,[52] this requires to set an expected sanction equal the expected collusive gain so that cartels are unprofitable in expectation. Empirical research[53] and back of the envelope calculations[54] show that - given current resources of law enforcing agencies - the Beckerian optimal fine is typically above firms' ability to pay, and therefore that in many jurisdictions actual fines are insufficient to discourage the formation of cartels. Moreover, in jurisdictions where claims senior to antitrust fines exist, colluding firms could strategically react to higher fines by issuing more of these securities and increasing their judgement proofness, further diluting deterrence.[55] Since either assumption (1) or assumption (2) are violated, following the Beckerian approach the optimal sanction policy requires also non-pecuniary sanctions, i.e. imprisonment, and therefore that also individuals should be held liable.[56]

[51] This assumption is usually made in the literature on antitrust law enforcement, see for instance Gregory J. Werden and Marylin J. Simon, *Why Price Fixers Should Go to Prison*, 32 Antitrust Bulletin 917 (1987). However, although naked price-fixing is a per se antitrust violation in many jurisdiction, it is important to keep in mind that there are circumstances in which competition harm consumers and a cartel can be beneficial also from a social welfare point of view (see e.g. Landes, William H., *Optimal Sanctions for Antitrust Violations*.50 University of Chicago Law Review, 652 (1983); Stiglitz, J. E., Imperfect Information in the Product Market, in Richard Schmalensee and Robert Willig, eds., 1 Handbook of Industrial Organization, Amsterdam: Elsevier Science Publishers, 771 (1989); Kranton, K., *Competition and the Incentive to Produce High Quality*, 70 Economica, 385 (2003); Buccirossi, P., *A Search Model Where Consumers Choose Quantity Based on Expected Price*; LI (4), Journal of Industrial Economics, 429, 2003; Calzolari Giacomo and G. Spagnolo, *Reputation and Collusion in Procurement*, manuscript, (2005).

[52] See Gregory J. Werden and Marylin J. Simon, *Why Price Fixers Should Go to Prison*, 32 Antitrust Bulletin 917 (1987) among others.

[53] See e.g. Craycraft, Catherine, Joseph L. Craycraft and Joseph c. Gallo, *Antitrust Sanctions and a Firm's Ability to Pay*, 12 Review of Industrial Organization, 171 (1997).

[54] See Gregory J. Werden and Marylin J. Simon, *Why Price Fixers Should Go to Prison*, 32 Antitrust Bulletin 917 (1987); Posner, Richard A. Antitrust Law: Second Edition. Chicago: University of Chicago Press (2001); UK Department of Trade and Industry, *A World Class Competition Regime,* (2001). W.P.J. Wils, Does the Effective Enforcement of Articles 81 and 82 EC Require Not Only Fines on Undertaking But Also Individual Penalties, In Particular Imprisonment? In CD Ehlermann and I Atanasiu (Eds.), European Competition Law Annual 2001: Effective Private Enforcement of EC Antitrust Law (Hart Publishing 2003), 411; and, for an international perspective, John M., Connor, *Private International Cartels: Effectiveness, Welfare, and Anticartel Enforcement,* (2003).

[55] So that regulation of such securities would also be required. See Che Yeon-Koo and Spier Kathrin, *Strategic Judgement Proofness,* manuscript, University of Michigan, (2005), and references therein.

[56] This argument is clearly an forcefully made by Gregory J. Werden and Marylin J. Simon, *Why Price Fixers Should Go to Prison*, 32 Antitrust Bulletin 917 (1987). A new argument for targeting employees has been advanced by Wallace P. Mullin and Christopher M Snyder, *Targeting Employees for Corporate Crime and Forbidding Their Indemnification*,

If firms are liable and able to pay the optimal fine, a different reason for holding employees liable comes from a possible violation of assumption (3). Provided that managers cannot be perfectly monitored, and that they personally benefit from forming a cartel, if the sanction that the firm can impose on them for breaching the law is limited, so that their expected net benefit from the cartel is still positive, then even if shareholders want their managers to act legally, they may not be able to provide them with the right incentives.[57] The relevant condition holds either if the sanction that is needed to discourage managers to form cartels exceeds their individual wealth and can be imposed only through imprisonment (something a firm clearly cannot do) or if firms face a limit on the magnitude of the pecuniary penalty it can impose on its employees and the optimal sanction calls for a fine above the firm's limit. In both cases, since the state does not face the same limits as the firm, individual liability may be needed to prevent cartel formation.

More generally, the extent to which the managers will react to penalties imposed on the company depends on the extent to which the manager participates to the cash flow right of the company's equity, that is, on his equity stake or on the elasticity of his compensation scheme to the company's profits. This creates an immediate connection between the effectiveness of penalties and the quality of corporate governance, since a key dimension of corporate governance is the alignment of the manager to the shareholder interests induced by the magnitude of his equity stake (or equivalent incentive compensation schemes).[58]

Let us now consider individual liability alone. Individual liability may not suffice if the wrongful act causes social harm or private benefits such that, given the probability of detection, the optimal sanction is above the maximum that can be imposed on individuals (violation of assumption 2).[59] If, in order to solve insolvency problems, individual sanctions are below the optimal level, assumption (1) is violated and since the expected fine is below the expected gain, principals may be willing to indemnify managers. In order to restore cartel deterrence the only possibility is to improve the enforcer's sanctioning power by holding companies liable as well.

Public and private monitoring. Monitoring firm's conduct essentially means monitoring their agents' behavior. Both public enforcement bodies and firms can monitor agents. Therefore, in setting a public enforcement mechanism we must understand its impact on the level of monitoring carried

Working Paper, George Washington University, 2005, available from www.ssrn.com. These authors argue that since criminal firms must pay higher wage to induce their employee to commit the crime, guilty employees will be richer than innocent ones, they are less protected by limited liability, and will therefore pay higher fines. Holding total fines (on firm and employee), this self-selection effect on fines increases deterrence.

[57] Mitchell A. Polinsky and Steven Shavell, *Should Employees Be Subject to Fines and Imprisonment Given the Existence of Corporate Liability?*, 13 International Review of Law and Economics 239 (1993), formalize this argument in the context of corporate tort. A possible solution to this problem is for the firm to improve its sanctioning power by paying a higher salary to the manager (i.e. an efficiency wage), conditioned on no infringements. However, this may entail higher production costs that also lead to allocative inefficiencies.

[58] This is why Giovanni Immordino and Marco Pagano, *Optimal Auditing Standards*, CSEF Working Paper 133, (2005), find that corporate governance and auditing quality regulation and enforcement tend to be complements. Their argument applies with little modifications to our context.

[59] See Jennifer Arlen and Reinier Kraakman, *Controlling Corporate Misconduct: An Analysis of Corporate Liability Regimes*, 72 New York University Law Review 687 (1997), among others.

out within the boundaries of the firm, with the aim of minimizing total social cost. To do so we must also take into account the incentives firms have to adopt *ex ante* and *ex post* policing measures and to report agents' misconduct.[60]

Firm incentives depend above all on the expected profits stemming from its actions and internal organization, which in turn depend on the level of the sanctions and the rules for its imposition. The following discussion is based on the assumption that the expected *level* of the sanction makes the illegal conduct unprofitable also *ex ante*. When the opposite is true, costly internal monitoring that prevents managers' misconduct will never be seriously implemented. Similarly, individual liability alone may remove incentives for corporations to monitor crime ex ante as principals, who have to decide the level of internal monitoring, are not directly penalized.[61] We discuss here the impact on monitoring of the choice between strict corporate liability and duty based liability or some composite regime.

Strict corporate liability, while providing firms with the optimal incentive to adopt preventive measures, has perverse effects on *ex post* policing measures insofar as it increases the expected liability for undeterred misconduct.[62] Internal policing measures affect firm's expected liability in two ways. On one hand, they increase agents' expected (internal) sanction and, by deterring some misconducts, they reduce firm's expected liability ("deterrent effect"). On the other hand, they may increase the probability that the government will detect and sanction undeterred illegal conducts, thereby increasing the firm's expected liability ("liability enhancement effect"). Strict corporate liability therefore creates a credibility problem for policing measures that may nullify the deterrent effect. Indeed, the *ex ante* threat of implementing policing measures is not credible if, once the misconduct has taken place, the firm has no incentive to undertake *ex post* actions. Hence, given this credibility problems the "liability enhancement effect" is likely to dominate.

A duty-based liability regime, in which corporations are liable only if they fail to satisfy a legal duty, restores the incentive for optimal monitoring. However, the application of a pure duty-based assumes the possibility of defining a verifiable internal policing standard that is socially efficient as it decreases the probability of a cartel so that its expected benefits outweigh its cost. Identifying such a standard is, at best, extremely difficult. Verifying its actual implementation probably harder.

A mixed regime may combine some desirable features of both strict and duty-based liability. In particular, "composite liability" is a regime that imposes duty-based liability, in order to induce

[60] For a rich informal analysis of this topic see Jennifer Arlen and Reinier Kraakman, *Controlling Corporate Misconduct: An Analysis of Corporate Liability Regimes*, 72 New York University Law Review 687 (1997). See also John Lott, Corporate Criminal Liability, in Encyclopedia of Law and Economics, (Edward Elgar 1999) (Bouckaert B and G. De Geest Eds.)

[61] This elegantly shown in a formal model by Instefjord Norvald, Patricia Jackson and William Perraudin, *Security Fraud*, 13 Economic Policy 585 (1998), who describe an infinite hierarchical chain of agents that have to decide whether to commit a fraud and the effort to exert to monitor their subordinate. They find that imposing strong penalties on the wrongdoer has no impact on the prevalence of frauds as, in equilibrium, it reduces the amount of internal monitoring. They conclude that regulators should care as much or more about incentives to monitor as they do about disincentives to commit fraud. Rewarding managers who identify actual or potential control problems and reducing the costs they face in monitoring are both likely to be effective policies.

[62] The formal analysys is provided by Jennifer Arlen, *The Potentially Perverse Effects of Corporate Criminal Liability*, 23 Journal of Legal Studies 832 (1994).

internal monitoring, upon a base of strict liability aimed at deterring collusion. In this regime a full default sanction may be reduced if the firm is able to prove that it implemented effective *ex ante* and *ex post* policing measures. If the mitigation factor is sufficiently high, then the firm has an incentive to introduce a compliance program, carry out investigations to detect agents' violations and report the misconduct once detected. Note however that although in principle this mixed regime can reach some seemingly conflicting goals, it may also impose high administrative costs due to the difficulty judges may face in determining whether the duty was effectively satisfied; and for the same reason it is subject to the discretionary power of prosecutors and prone to judicial errors. Thanks to the multi-agent properties of cartels, leniency and bounty programs may provide a feasible way out, as will be explained in the next subsection.

Agency, leniency, and whistleblowers. The above arguments rest on the implicit assumption that there are no leniency programs, and that cartels can be only deterred by increasing expected sanctions up to a level that renders participating to a cartel unprofitable in expectation (rendering conspirators' "participation constraints" no longer satisfied). However, the modern theory of collusion, starting from Stigler (1964), teaches us that cartels are successful (reduce welfare) only if participants have sufficient incentives to stick to the agreed market conduct rather than undercutting each other with secret price cuts, i.e. if coconspirators are able to "govern opportunism" within the cartel. Cartels, therefore, can be better fought by shaping the law enforcement policy to encourage firms to behave opportunistically with respect to their coconspirators and undercut the collusive agreement (tightening firms' "incentive constraints"), thereby destabilizing and deterring even "profitable cartels". The recent introduction of leniency programs in many world jurisdictions may do exactly this: well-designed leniency programs can destabilizes profitable cartels by making undercutting the cartel even more profitable that sticking to it, imposing a new analysis of the optimal public enforcement of antitrust law.

Leniency programs reduce sanctions against the first firm or individual that reports information on a cartel (or other multiagent crime) he participated to, allowing to convict his former coconspirators.[63] The effectiveness of these programs in destabilizing and deterring cartels can be reinforced by the offer of a bounty, a reward financed by part or all fines paid by convicted partners, to the wrongdoer that first self-reports.[64] In the Beckerian single-agent single-crime model a subject has to decide whether

[63] Leniency programs where first formally analized within an appropriately dynamic model by Motta, Massimo, and Polo, Michele, *Leniency Programs and Cartel Prosecution*, 21(3) International Journal of Industrial Organization, 347 (2003), who focused on their ability to facilitate prosecution.

[64] As proposed in G. Spagnolo, *Optimal Leniency Programs,* FEEM Nota di Lavoro 42.00 (2000), P. Buccirossi and G. Spagnolo, *The Effects of Leniency on Illegal Transactions: How (Not) to Fight Corruption.* Working Papers in Economics and Finance No. 456, Stockholm School of Economics (2001) and Aubert, C., Kovacic, W. and P. Rey, *The Impact of Leniency Programs on Cartels*, unpublished manuscript, IDEI Toulouse (2004), and successfully done for other forms of multiagent crime, like government fraud under the US Fals Claim Act. We believe that the main efficiency enhancing potential of optimally designed leniency and whistleblower programs is not in terms of improved prosecution, but in their ability to *directly* deter, prevent cartel formation - avoiding costly prosecution alltoghether - by "underminintg trust" among would be conspirators with the threat that one of them could then cheat on partners and self-report, turning the others in. See Spagnolo *Leniency and Whistleblowers in Antitrust*, in Buccirossi P. (Ed.), Handbook of Antitrust Economics, Cambridge, The MIT Press (2007), for a deatiled comparative discussion.

to commit a crime or not and, if leniency for self-reporting is offered, whether to self-report after committing the crime. In cartels and other multiagent crimes, where wrongdoers may profit from cheating on each other and collaboration is sustained by the prospect of future gains from further misconduct or by the threat of revenge, subjects have additional possibilities, including the one of cheating on partner wrongdoers and self-report - turning in coconspirators - to avoid both sanctions and, possibly, revenge (e.g. when coconspirators end up in jail).

Once leniency/bounty programs and incentive constraints enter the picture, the level of the optimal fine required to deter a cartel changes dramatically. By modifying the payoff attached to the course of action not available in the Beckerian setting, leniency ensures that a much lower fine is needed to deter multiagent crimes: if rewards are feasible, cartel deterrence may require a sanction not higher than 10% of the optimal gain-based Beckerian fine.[65] Given this level of the optimal fine, below firms' typical ability to pay, corporate liability is likely to provide shareholders and other stakeholders with the correct incentives to avoid misconducts by their managers.[66]

What is even more important for the topic of this chapter, firms are composed by numerous individuals with potentially different objectives. This is the cause of firms' agency problems, and leniency and whistleblowers programs may exploit them to further improve cartel deterrence. In the US, in particular, both corporations and individual employees are liable if involved in a cartel, and there is the possibility to apply for individual or for corporate leniency[67]. Individual and corporate liability accompanied by individual and corporate leniency programs inflate the governance problems of firms involved in a cartel, increasing deterrence through higher agency costs of collusion. Individual applications are never observed, but this does not imply that individual leniency is ineffective. It is not directly used, but it is a credible threat in the hands of individual whistleblowers that pushes corporations to apply for corporate leniency before its managers do it individually.[68]

Rewards for individual employees that blow the whistle to their own firm have an analogous

[65] Buccirossi, P., and G. Spagnolo, *Optimal Fines in the Era of Whistlblowers: Should Price Fixers Still Go To Prison?*, forthcoming in The Political Economy of Antitrust (Goshal, V. and J. Stennek Eds. 2005), Amsterdam: Elsevier, show this with simulations under many different parameter configurations.

[66] If rewards are allowed, principals do not face the constraints identified by Mitchell A. Polinsky and Steven Shavell, *Should Employees Be Subject to Fines and Imprisonment Given the Existence of Corporate Liability?*, 13 International Review of Law and Economics 239 (1993) to replicate these incentives in managers' compensation, and if the program is sufficiently generous in its rewards to first-in applicants, the program can in principle reach a first best in which monitoring, both external and internal, becomes redundant (Spagnolo G., *Divide et Impera: Optimal Leniency Programs*, CEPR Discussion Paper No. 4840 (2004)).

[67] If an individual manager applies alone for leniency under the Individual Leniency Policy (ILP), and all conditions are met, sanctions are waived only for the applying individual. If, instead, a firm applies for leniency under the Corporate Leniency Program (CLP) and meets all the necessary conditions, then sanctions are waived for the firm and all its managers, employees, and directors.

[68] Hammond, Scott D., *Cornerstones of An Effective Leniency Program*, U.S. Department of Justice (2004), available from http://www.usdoj.gov/atr/public/speeches, argues that the possible "Race to the Courthouse" between individual employees and corporations is a powerful incentive for firms to self-report under the CLP. For formal analyses of this aspect, see Cecile Aubert, William Kovacic and Patrick Rey, *The Impact of Leniency Programs on Cartels*, unpublished manuscript (2004); Festerling, Phillip, *Cartel Prosecution and Leniency Programs,* manuscript, University of Copenhagen (2005); and, in another context, Guriev, Sergei, *Earnings Manipulation and Incentives in Firms*, CEPR Discussion Paper No. 4850 (2005).

deterrence effect that also goes through an increase in agency costs for firms involved in a cartel.[69] A colluding firm has to increase pay to its employees informed of its misbehavior to prevent them from reporting information under an individual leniency program, and these rents increase enormously if employes are entitled to a reward when reporting a cartel. This improves cartel deterrence by directly increasing the cost of collusion. Also, there may be complementarities in deterrence between whistleblowers' bounty schemes and corporate leniency programs, in the sense that together they further increase incentive to defect from collusive strategies. When defecting from a cartel in presence of a bounty scheme a firm would still have to compensate its informed employees to prevent them from reporting. With both rewards for whistleblowers and a corporate leniency program, firms could defect from collusion and report, avoiding to pay anymore rents to informed employees. This further increases the attractiveness of defecting from collusion, so that the impact on cartels is even stronger than the impact that individual bounty schemes or corporate leniency programs alone would have.

Of course these schemes may imply additional costs, and will certainly do it (as any other legal intervention) if they are not appropriately designed and implemented. Insofar as costs grow only for firms that collude, the costs increase cartel deterrence and are welfare enhancing. This is for example the case of an inefficient reduction of employees turnover colluding firms may be led to in order to reduce the rents needed to buy employees' silence. There may be an increase in administrative costs of law enforcement, but if these schemes are properly designed and implemented, its size is likely to be small compared to possible additional deterrence effects. For example, it has been argued that rewards to whistleblowers would substantially increase law enforcement costs by stimulating "information fabrication" to cash undue rewards. This pessimistic forecast, certainly justified for badly designed schemes, does not seem to be empirically borne out by the US experience with the False Claim Act, a well designed reward scheme carefully implemented by Department of Justice and courts. Under this scheme, individuals reporting frauds to the federal government are entitled to up to 30% of all funds recovered (some employees became very, very rich...), and no serious information fabrication problem emerged. Moreover, problems of information fabrication, were serious, can be directly addressed by increasing sanctions against this very practice. Since in fabricated cartel cases information fabricants would face several firms' legal offices ready to fight a long legal war to show their (true) innocence, deterring information fabrication appears an easy task.

Other possible social costs of these "high powered" legal incentive schemes are linked to the possibility of Type I errors, i.e. of erroneous convictions of innocent firms and individuals.[70] Frequent Type I errors and large penalties and rewards could substantially increase costs also for non-colluding firms acting "at the border but within legality", who may be led to distort their investment, employment, and organizational policies to minimize the risk that their legal activity is mistakenly taken for an illegal one. For example, firms cooperating with competitors on legal dimensions (e.g. R&D) may be induced to spend excessive resources in internal monitoring/compliance programs, or to abandon

[69] See Cecile Aubert,William Kovacic and Patrick Rey, *The Impact of Leniency Programs on Cartels*, unpublished manuscript, (2004).

[70] Bruce Kobayashi, *Antitrust, Agency and Amnesty: An Economic Analysis of the Criminal Enforcement of the Antitrust Laws Against Corporations*, George Mason University Law and Economics Working Paper 02-04, (2002), focuses on this issue.

pro-competitive joint ventures with competitors; these additional costs would then likely be passed on to consumers.[71] We believe, though, that in most advanced countries, a strict application of the rule of law and the high standard of proof required in criminal cases make type I errors less likely than type II errors, and that this is particularly true for companies and white collars who typically have sufficient resources to guarantee themselves an accurate defence. Still, it is possible that to maximize efficiency the standard of proof should be raised when introducing rewards schemes and similar high powered incentives; and it is likely that courts will autonomously tend to increase the standard of proof when rewards are at stake[72].

We conclude that:

- Agency costs and related governance problems are crucial determinants of the efficient design of antitrust law enforcement
- Cartels are formed and run by managers. A sanction policy must affect their incentives. This can be accomplished indirectly imposing sanctions on firms. Individual liability is necessary if either the optimal enforcement policy requires the imposition of non-pecuniary sanctions, or the principal-agent relationship cannot be shaped so as to efficiently pursue the principal's goals.
- Internal monitoring can prevent the formation of cartels. Composite liability regimes may provide the right incentives to monitor managers' behavior. However, they have high administrative costs and are prone to judicial errors.
- Leniency and whistleblower programs can be designed to maximize agency problems and related governance costs for cartels and individual firms that participate to them (as well as for other criminal organizations), greatly improving the effectiveness of antitrust law enforcement (deterrence) and simultaneously reducing its cost.

5 Concluding remarks: other forms of collusion and caveats

The peculiar characteristics of a cartel that are important for the optimal design of law enforcement are that multiple agents are involved; that there is scope for moral-hazard, free riding, and profitable cheating in general within the group of wrongdoers; and that being the activity illegal, explicit contracts that limit opportunism cannot be enforced. These three characteristics, at the core of the cartels' "governance problem", are also typical of other multiple - agent infringements, including: collusion between auditors and management, or regulators and regulated firms; large scale corruption

[71] On the costs of antitrust law enforcement when Type I errors are numerous see Kobayashi (2002) and Cecile Aubert,William Kovacic and Patrick Rey, *The Impact of Leniency Programs on Cartels*, unpublished manuscript (2004), who identify several situations in which innocent firms may decide to adopt inefficient organizational decisions in order to reduce the risk of being convicted for collusion. Dworkin, T.M. and J.P. Near, 1997, *A Better Statutory Approach to Whistleblowing*, 7 Business Ethics Quarterly ,1 (1997) argue that whistleblowing may contribute to an environment of mistrust and uncertainty and have negative effects on organizational efficiency.

[72] See Buccirossi, P., Palumbo, G., and G. Spagnolo, Whistleblowers and Corporate Fraud, manuscript, Lear and Bank of Italy, (2005), address this question theoretically.

and fraud; mafia, terrorism, and analogous forms of organized crime; and most kinds of illegal trade. As cartels, all these multi-agent illegal activities also cannot rely on explicit contracts enforced by the legal system, and to limit internal moral hazard and prevent 'hold up' must take the form of long-term, dynamic criminal *relationships,* where reputational considerations and implicit contracts substitute for explicit contracting. The conclusions derived earlier, therefore, apply with little modification also to these other forms of multiagent - corporate crime.

Public policy against cartels and other forms of corporate and organized crime can take advantage of their essential features and fight them by undermining the stability of the implicit contracts they are based upon. However, agents need to cooperate also to pursue welfare enhancing projects and implicit contracts are often needed to this end too. Since we are not always able to perfectly separate the good from the evil, we must be aware that preventing the formation of these implicit contracts, in some cases, may cause more harm than good.