WORKING PAPER

N° 2024-6

INCREASED FINES FOR REPEAT OFFENDERS AND CONGLOMERATE DYNAMICS

ARMEL JACQUES

www.tepp.eu

TEPP – Theory and Evaluation of Public Policies - FR CNRS 2042

Increased fines for repeat offenders and conglomerate dynamics

Armel JACQUES*

June 6, 2024

Abstract

We analyze the choice of organization between conglomerates and stand-alone firms of groups wishing to collude on several markets. A conglomerate organization makes it possible to exploit synergies between different activities. By organizing themselves into independent firms, the groups are not considered to be repeat offenders when the second cartel is convicted, and thus avoid the increased fines applicable to repeat offenders. When synergies are low, groups split into stand-alone firms during one of the collusion phases, then re-form conglomerates. This dynamic may help explain the existence of a conglomerate discount.

Keywords: Conglomerates, collusion, multi-market contacts, competition policy, repeat offenders, conglomerate discount.

JEL Classification: L41, K21, D43, G34.

1 Introduction

This article studies the impact of increased fines for repeat cartel offenders on the organizational dynamics of firms that may form conglomerates or remain independent.

Many competition authorities consider recidivism as an aggravating factor that can lead to higher fines for cartel participation. For example, the European authorities' 2006 guidelines on the method of calculating fines state: "*where an undertaking continues or repeats the same or a similar infringement after the Commission or a national competition authority has made a finding that the undertaking infringed Article 81 or 82: the basic amount will be increased by up to* 100% *for each such infringement established*".

In this article, we put forward the idea that multi-product industrial groups may have an interest in splitting their activities into independent firms, despite the existence of synergies between these activities, in order to be able to collude on several markets without being considered repeat offenders. This strategy can take two forms. Firstly, a multi-product firm begins by colluding on several markets simultaneously, until the competition authority discovers one of the collusion agreements of which it is a member. Following this discovery, the firm divests its subsidiaries operating in markets where collusion agreements have not yet been discovered. This allows the firm to continue colluding in these markets without incurring increased

*CEMOI TEPP-CNRS (FR2042), Université de La Réunion, Faculté de Droit et d'Economie, 15, avenue René Cassin, 97715 Saint-Denis messag cedex 9. Email : Armel.Jacques@univ-reunion.fr.

fines. Secondly, an industrial group organizes itself into several stand-alone firms in order to participate in agreements on several markets. Following the conviction of one of the agreements, one of the firms operating in the other markets (and which has not yet been convicted of collusion) buys out the activities of the firm which has just been convicted. This acquisition enables the firm to benefit from potential synergies between its different activities, while continuing to collude in markets where it has not yet been detected, without risking an increase in the fine. These strategies are attractive when the synergies between the various activities are relatively low and the increase in the fine in the event of recidivism is high.

Two examples illustrate this strategy. In 2004, the Alstom conglomerate sold its T&D (Transmission and Distribution) division to the Areva group. In 2007, the European competition authority ruled against an electrical cartel in which the T&D subsidiary had participated. In 2008, Alstom's CEO argued for a merger of his group with Areva, but was opposed by the latter's CEO. In 2010, Areva sells its T&D subsidiary to Alstom and Schneider Electric.[1] So Alstom spun off one of its businesses for a few years, then bought it back after it stopped colluding. In 2002, the Sodiaal cooperative sold 50% of its Yoplait subsidiary to PAI partners. The latter sold this stake to General Mills in 2011. Shortly after the acquisition, the buyer applied to the European leniency program and denounced Yoplait's participation in the "yogurt cartel". This cartel was condemned in 2015. In 2021, Sodiaal acquires General Mills' share in Yoplait's French activities. In this example, too, a group sells activities that are then implicated in an investigation for an illicit cartel, then buys them back once the antitrust proceedings have been completed. The theory developed in this article offers a possible explanation for these phenomena.

This study nuances the idea, fairly widespread in economic literature, that multi-market contacts facilitate collusion. For certain parameter values, it is, on the contrary, the appearance of stand-alone firms, despite the existence of synergies, that may give rise to suspicions that firms are involved in cartels. Edwards (1955) was one of the first to argue that conglomerates can more easily set up collusion agreements than stand-alone firms because they can inflict harsher punishments on their competitors by triggering them in several markets. Bernheim and Whinston (1990) explored this idea, with a more rigorous formalization, and showed its relevance when markets present asymmetries. Spagnolo (1999) has shown that the pro-collusive effect of multi-market contacts also exists when firms have concave objective functions. Pénard (2000) and Matsushima (2001) have shown that multimarket contacts reduce the frequency of price wars when information on the behavior of competing firms is imperfect, as in the Green and Porter (1984) model.

Thomas and Willig (2006) have qualified this view by arguing that, if firms are present in a market where information is imperfect, as in Green and Porter's (1984) model, and in a market where it is perfect, it is preferable for these firms not to combine collusion agreements made in each market into a single agreement covering both markets. Indeed, this does not reduce the frequency of price wars in the market where information is imperfect, and it extends the periods of price wars to the other market. Dargaud and Jacques (2015) have formulated a second nuance, in a model incorporating a competition authority. When the competition authorities suspect the existence of a cartel, they launch an in-depth investigation

[1] The activities bought by Alstom will be sold again in 2014, this time to General Electric, against the backdrop of legal proceedings brought by the USA against Alstom for bribery in tenders.

into the activities of the firms concerned. During these investigations, the competition authorities frequently discover the existence of other cartels involving the same firms. The authors defend the idea that firms simultaneously involved in several cartels can reduce the likelihood of a second cartel being discovered during an investigation into a first cartel by adopting a decentralized organization. Firms may prefer the M-form (multidivisional form) organization to the U-form (unitary form) one, in order to compartmentalize their collusion agreements.

This study also adds to the literature on the impact of anti-cartel policy on firm organization, highlighting the potential role of recidivism treatment. Dargaud and Jacques (2015), as mentioned above, have defended the idea that firms engaging in collusion on several markets simultaneously may have an interest in adopting a decentralized organization to compartmentalize their various agreements and avoid the detection of one leading to the detection of others. The authors briefly discuss the impact of an increased fine for repeat offenders. In their model, this increase favors the adoption of the U-form organization. Indeed, if the fine is increased on the second conviction, the continuation of the collusion is less profitable for the firms, and they therefore have less incentive to reduce the probability of the second cartel being discovered during the first investigation. Their interest in choosing the M-form organization diminishes. Dargaud and Jacques (2020a, 2020b) have studied the impact of the introduction of a leniency program on firms' choice of organization. Dargaud and Jacques (2020a) have shown that the leniency program can encourage firms' CEOs to denounce the existence of the second cartel, after the opening of an investigation targeting the first. The M-form no longer makes it possible to separate the two agreements. Leniency programs therefore encourage firms to revert to the U-form organization. In contrast, Dargaud and Jacques (2020b) argue that a leniency program may lead firms to choose the M-form organization in order to delay antitrust investigations and give themselves time to denounce the second cartel before it is discovered by the competition authorities. In these studies, the choice of organization is between the multi-divisional and the unitary form. Jacques (2003) reconsiders the idea that greater decentralization reduces the risk of discovery of the second cartel, but analyzes it in a model where groups choose between organization as a conglomerate or as two stand-alone firms. It differs from previous studies in that it allows firms to modify their organization over time, whereas in previous studies, the choice of organization is fixed at the start of the game and is not modified.[2] Jacques (2003) finds, as in this study, that groups may have an interest in splitting up temporarily when they collude. The underlying mechanism is different, however, and the evolution of group organization is not always the same. In Jacques (2003), the aim of splitting into two firms is to avoid the discovery of a second cartel during an investigation into a first cartel. The separation of activities into two independent firms is therefore only of interest if the groups collude on several markets simultaneously. The groups therefore split up at the start of the game and re-form a conglomerate after the first conviction. This strategy can also be seen in this study. On the other hand, in this study, we can also have a conglomerate organization at the start of the collusion and a split-up after a first conviction. In Jacques (2003), firms never chose this course

[2]Dargaud and Jacques (2015, 2020a and 2020b) assume that firms compete on price with homogeneous goods in each market. So when firms no longer collude, prices are equal to marginal cost and profits are zero. Firms are then indifferent between the different possible organizations. They therefore have no interest in modifying their organization once the collusion is dissolved. To observe changes in organizations, we need to modify some of the assumptions of these models.

of action. The modification of the advantage linked to the separation of firms can therefore lead to different developments. Bageri, Katsoulacos and Spagnolo (2013) highlight another mechanism that can generate an impact of anti-cartel policy on firm organization. Under European legislation, fines may not exceed 10% of a company's total sales. The maximum fine incurred by a firm operating in other sectors is therefore higher than that faced by a firm active only in the market covered by the cartel. The authors note that this may encourage firms not to diversify

The fight against cartels can therefore encourage certain industrial groups to split up temporarily, despite the existence of synergies between their activities. This effect may help explain the decline of industrial cartels in the 1980s and 1990s, at a time when the fight against cartels was being stepped up. It can also help explain the conglomerate discount often observed in empirical studies. If groups tend to organize themselves into stand-alone firms when they collude, and re-form conglomerates after the collusion has dissolved, then stand-alone firms may appear more profitable than apparently comparable conglomerates, and therefore be better valued on financial markets.

This study may also have implications for the design of anti-cartel measures. In this study, conglomerates enable synergies to be generated. This form of organization is therefore socially preferable to stand-alone firms. If the fines incurred and the increase in fines in the event of recidivism are not sufficient to totally deter collusion, a reduction in fines and the increase in fines in the event of recidivism can increase the social surplus by encouraging industrial groups not to split up their activities.

This study is organized as follows. Section 2 presents the model. We then analyze the different collusion strategies that firms can choose (section 3). Section 4 compares the possibilities of sustaining these different strategies. Section 5 looks at the group organization choices. The implications of the results obtained are developed in Section 6. The existence of a conglomerate discount is discussed in section 7, and we conclude in section 8.

2 Model

The model includes two goods, A and B, whose markets are totally independent. Each of the goods is produced in two production sites owned by different firms. Plants A1 and A2 produce good A. Plants B1 and B2 produce good B. Production lines A1 and B1 can be managed by two independent firms, or combined in a conglomerate. The same applies to production lines A2 and B2. For antitrust reasons, it is forbidden to merge plants A1 and A2 [B1 and B2 respectively] to form a monopoly on the market for good A [B].

The firms compete in quantities in an infinite-horizon setting. They can enter into collusion agreements based on grim trigger strategies. The discount factor is equal to δ. Collusion agreements are prohibited, and an antitrust authority is responsible for identifying, fining and dissolving them.

Demand: In each period, the inverse demand functions for the two goods are linear and equal to:

$$p^A\left(Q^A\right) = a - Q^A \quad \text{and} \quad p^B\left(Q^B\right) = a - Q^B$$

Organization: At the beginning of each period, the owners of the various production sites can merge them to form a conglomerate, or separate them into two stand-alone firms. This choice is made non-cooperatively. Organizational change has a cost R (financial costs to buy or sell a firm, reorganization costs, etc.).

The form of organization chosen influences the fixed costs that firms incur in each period. A specialized firm incurs a fixed cost each period equal to f. Conglomerates make it possible to avoid duplicating part of the fixed costs of both activities. Conglomerates therefore generate synergies. A conglomerate incurs a fixed cost equal to $(2-\lambda)f$ each period, with $\lambda \in [0,1]$. Firms produce with a constant marginal cost, c, normalized to 0.

If a conglomerate decides to split in two, each of its shareholders receives a proportion of the shares of each of the two new firms equal to its initial share in the conglomerate. In other words, demergers are carried out by distributing shares. When two independent firms decide to merge, their shareholders share the gains generated by the merger equally. If, prior to the merger, the two companies are perfectly identical, it seems quite logical to assume that they are merging as "equals". The shareholders of each firm therefore share half the shares of the new conglomerate on a pro rata basis. If the merging firms are in different situations (because one of the firms can still collude in its market, while the other can no longer), we assume that the negotiation leads to an equal sharing of the gains.[3] In the model, gains are limited to synergies, λf, less reorganization costs, R. The firm being bought out therefore obtains a price equal to its discounted profits if it had remained independent plus $\frac{1}{2}\left(\frac{\lambda f}{1-\delta} - R\right)$.

In this study, we are interested in the evolution of firm organization. We will therefore focus on the case where R is sufficiently low for firms to have an interest in changing their organization, which requires $R \leq \frac{\lambda f}{1-\delta}$. To simplify the calculations, we assume $R = 0$. We also assume that the new organization is implemented immediately.

Competition policy: There is a competition authority that can detect and punish collusive agreements. During each period, the authority has a probability ρ of detecting an agreement on the market for one of the goods. The detection of an agreement automatically leads to its condemnation. Convicted firms are fined for each market in which collusion has been proven. The amount of the fine depends on the firm's history. If it is a first conviction, the fine is equal to F. On the other hand, if the firm has already been convicted, it is considered a repeat offender, and the fine is increased to θF, with $\theta \geq 1$. If an agreement is condemned, it is dissolved and collusion is no longer possible on this market in the future.

For a firm to be considered a repeat offender, several conditions must be met. The first is that the two offences must be identical or similar. European case law has adopted a broad definition of similarity. Two collusion agreements are considered similar offences, even if they concern different products or geographically

[3]This is not the only possible hypothesis. It could be in the firms' interest to agree that, if one firm deviates from a collusive agreement, the other firm can make a take-it-or-leave-it offer and thus obtain the entire surplus. Such a commitment would reduce the incentive to deviate from a collusive agreement. However, it appears complex to implement in practice. The assumption of an equal sharing of gains has also been retained to avoid having to assume different haggling rules according to history, which would have lengthened developments.

distinct markets.[4] The conviction for the first offence must be final at the time the second offence is committed. In this model, this implies that if both cartels are detected simultaneously, the firms are not considered repeat offenders and must pay two fines of F (one for each offence). In this model, there are no judicial errors and no appeal procedures. The condition that the conviction must be final poses no problem. The third condition concerns the length of time between the two offences. European legislation does not specify a time limit. In practice, recidivism has been accepted in some cases, even though the previous offence was some twenty years old. For simplicity's sake, this model assumes that recidivism is perpetual. A second offence committed by the same firm will always be considered a repeat offence. The fourth and most important condition is that the offender must be the same. If a conglomerate is condemned on market A, then on market B, it is the same firm, even if it sold its business on market A after the first condemnation. On the other hand, if a conglomerate sells its business on market B, after having been convicted on market A, the purchaser of business B will not be considered a repeat offender if he is subsequently convicted of a cartel on market B (because it was not he who committed the infringement on market A). The same would apply if a firm in activity B bought out a firm in activity A that had just been convicted of taking part in a cartel. If this firm is subsequently convicted of taking part in a collusion agreement, it will not be considered a repeat offender, since it did not yet own activity A at the time of the first conviction. It is therefore possible to escape the qualification of recidivism by separating the two activities in separate firms during one of the phases of collusion. This hypothesis is central to the results obtained in this article.

If a firm deviates from the collusion agreement, the agreement remains detectable during this period. This is because prices during the deviation period remain monopoly prices. Customers therefore have the same probability of suspecting collusion and referring the matter to the competition authorities. On the other hand, during the punishment, the collusion has come to an end and the agreement can no longer be detected.

Forms of collusion agreements: To simplify the resolution of the model, we assume that δ is sufficiently high and F is sufficiently low for firms to choose to collude and to produce monopoly quantities when colluding. The restrictions imposed on these parameters will be explained at the beginning of Section 5. We assume that collusion agreements provide for an equal sharing of markets between firms, even if the latter have chosen different modes of organization.

Game timeline: Each period consists of several stages according to the chronology: (1) Choice of organization, (2) if collusion is still possible, company managers can meet and negotiate production quotas, (3) firms choose their quantities and profits are realized, (4) an investigation is launched with a probability of ρ on each market. Firms pay any fines imposed during the period.

Notations: We will use a capital Π to write down the expected discounted profits of a group. The subscript indicates the number of collusion agreements already detected. The superscript indicates the

[4] Even if they are located in different European Union countries.

forms of organization chosen by the group. The first letter designates the organization chosen when no collusion agreement has yet been detected. The second letter indicates the chosen organization when one (and only one) agreement has already been condemned and dissolved. For example, Π_1^{CI} corresponds to the profit expectancy of a group that has already been convicted of belonging to a cartel, was organized as a conglomerate before this conviction and chose to split into two independent firms just after this conviction. The discounted profits after the dissolution of the two collusion agreements deviate from the above rule and will be noted as Π_2^C. The same indices and exponents will be used for the sustainability thresholds of the different collusion strategies.

3 Possible collusion strategies

It is always in the firms' interests to form conglomerates after the two collusion agreements have been dissolved. In fact, if collusion no longer exists in a market, firms compete in quantities *à la* Cournot. In the absence of collusion, firms make greater profits by forming a conglomerate than by dividing their activities into two independent firms. Conglomerates enable firms to generate synergies and reduce fixed costs. The discounted savings are equal to $\frac{\lambda f}{1-\delta}$. Since we have assumed that $R \leq \frac{\lambda f}{1-\delta}$, firms will choose the conglomerate form if they have not already adopted it. So, in the last phase of the game, the groups have conglomerate form. After the collusion is dissolved, the discounted profit of a conglomerate present in both markets is equal to:[5]

$$\Pi_2^C \equiv \frac{1}{1-\delta}\left[\frac{2}{9}a^2 - (2-\lambda)f\right]$$

Four collusion strategies are therefore conceivable: (C,C,C); (I,C,C); (C,I,C) and (I,I,C). The first letter corresponds to the organization of the group prior to the detection of the first collusion agreement (what we will call the first phase of the game or the first phase of collusion). The second letter indicates the organization retained after the detection of the first collusion agreement and before the detection of the second agreement (referred to as the second phase of the game or the second phase of collusion). The third letter corresponds to the organizational form chosen after the dissolution of the two collusion agreements (the third phase of the game).

(I,I,C) is dominated by (I,C,C) and (C,I,C). In fact, the advantage of choosing I is to avoid an increased fine in the event of a repeat offence. Choosing I during the first or second phase is enough to eliminate this risk. It is useless to choose I for both. This leaves only three possible strategies at equilibrium: (C,C,C), (I,C,C) and (C,I,C), which we will now describe in detail.

3.1 (C,C,C) strategy

The (C,C,C) strategy involves firms forming conglomerates at the start of the game and maintaining this form throughout. Initially, the firms collude on both markets simultaneously. Once the collusion on one market has been dissolved, the firms continue to collude on the other until the competition authority detects

[5] The quantities produced and equilibrium prices in the different situations are specified in the appendix (section 9.1).

the second agreement and puts an end to it. This strategy enables firms to benefit from synergies in all phases of the game. It does, however, have the disadvantage of exposing firms to an increased fine in the second phase of the collusion agreement.

In the third phase of the game, the conglomerate's discounted profit is equal to: Π_2^C.

In the second phase of the game, the conglomerate's discounted profit is equal to:[6]

$$\Pi_1^{CC} = \frac{\frac{17}{72}a^2 - (2-\lambda)f - \rho\theta F + \delta\rho\Pi_2^C}{1-\delta(1-\rho)}$$

For collusion to be sustainable in this phase, it is required that:

$$F \leq F_1^{CC} \equiv \frac{17\delta(1-\rho)-9}{576\delta(1-\rho)\rho\theta}a^2$$

In the first phase of the game, the conglomerate's discounted profit is given by:

$$\Pi_0^{CC} = \frac{\frac{2}{8}a^2 - (2-\lambda)f + 2\rho(1-\rho)\delta\Pi_1^{CC} + \rho^2\delta\Pi_2^C - 2\rho F}{1-\delta(1-\rho)^2}$$

Firms have an interest in respecting the collusion agreement during this first phase if and only if:

$$F \leq F_0^{CC} \equiv \frac{\left[1-\delta(1-\rho)^2\right]\left[17\delta(1-\rho)-9\right]}{576\left[\rho(\theta-1)+1-\delta(1-\rho)^2\right]\delta(1-\rho)\rho}a^2$$

If $\theta = 1$, $F_0^{CC} = F_1^{CC}$. In the absence of an increase in the fine, the conditions of sustainability during the two phases of collusion are identical. This is the result of Bernheim and Whinston (1990). Multi-market contacts do not affect firms' ability to collude if the different markets in which the firms are in contact are identical. The possibility of sustaining the monopoly price therefore does not depend on the number of markets involved in collusion.

If $\theta > 1$, we have $F_0^{CC} > F_1^{CC}$.[7] Collusion is more fragile in the second phase, as firms risk an increased fine because they will be considered repeat offenders.

The (C, C, C) strategy is therefore sustainable if and only if $F \leq F_1^{CC}$. A higher fine for repeat offenders (i.e. an increase of θ) makes this strategy more difficult to sustain. With a higher fine for repeat offenders, multi-market contacts make collusion more difficult to sustain.

3.2 (C, I, C) Strategy

The (C, I, C) strategy consists in initially colluding on both markets simultaneously by adopting a conglomerate organization. When the competition authority detects one of the collusion agreements, the collusion ceases on that market, but continues on the other market. To avoid a higher fine on the second market, conglomerates sell off the subsidiary active on the second market. Once the collusion on the secondary

[6] The calculations leading to the different expressions are detailed in the appendix.

[7] Indeed: $F_0^{CC} \geq F_1^{CC} \Leftrightarrow 1-\delta(1-\rho) \geq 0$. This condition is necessarily verified.

market has been dissolved, the conglomerates buy back the business they previously sold, in order to exploit potential synergies once again. The aim of this strategy is to avoid a higher fine by temporarily severing the links between the subsidiary pursuing the collusion and the conglomerate that has already been convicted. The disadvantage of this strategy is that firms must forego synergies between the two activities during the second phase of the game.

In the third phase of the game, the conglomerate's discounted profit is equal to Π_2^C. In the second phase of the game, the sum of the discounted profits of the two independent firms is equal to:

$$\Pi_1^{CI} = \frac{\frac{17}{72}a^2 - 2f - \rho F + \delta\rho\Pi_2^C}{1 - \delta(1-\rho)}$$

For collusion to be sustainable in this phase, it requires:

$$F \leq F_1^{CI} \equiv \frac{17\delta(1-\rho) - 9}{576\delta(1-\rho)\rho}a^2 - \frac{\lambda f}{2\rho}$$

In the first phase of the game, the conglomerate's discounted profit is given by:

$$\Pi_0^{CI} = \frac{\frac{2}{8}a^2 - (2-\lambda)f + 2\rho(1-\rho)\delta\Pi_1^{CI} + \rho^2\delta\Pi_2^C - 2\rho F}{1 - \delta(1-\rho)^2}$$

A conglomerate has an interest in complying with the collusion agreement, in the first phase, if and only if:

$$F \leq F_0^{CI} \equiv \frac{17\delta(1-\rho) - 9}{576\delta(1-\rho)\rho}a^2 - \frac{\lambda f}{1 - \delta(1-\rho)^2}$$

If $\lambda f = 0$, $F_0^{CI} = F_1^{CI}$. If $\lambda f > 0$, we have: $F_0^{CI} \geq F_1^{CI} \Leftrightarrow 1 - 2\rho - \delta(1 - 2\rho + \rho^2) \geq 0$. This condition is never verified for $\delta = 1$, but it is verified for most parameter values as soon as $\delta < 1$. In the remainder of this article, we assume that this condition is met. The strategy (C, I, C) will therefore be sustainable if $F \leq F_1^{CI}$.

The thresholds F_0^{CI} and F_1^{CI} are decreasing functions of λf. The existence of potential synergies reduces the possibility of sustaining collusion in the (C, I, C) strategy. Synergies increase the value of Π_2^C, and therefore the profits obtained on the punishment path after a firm's deviation. On the other hand, they do not affect firms' profits during the second phase of collusion. They therefore increase firms' incentives to deviate from the collusion agreement.

3.3 (I, C, C) Strategy

The (I, C, C) strategy is very similar to the previous one, but the organization of the groups during the first two phases is reversed. Initially, the two groups chose to organize themselves as two independent firms, each colluding in its own market. Once the competition authority has dissolved the collusion in one of the markets, the firm that has not yet been condemned buys out the business of the firm that has been condemned, to form a conglomerate. The firm in the market where the collusion has not been dissolved can continue the collusion without risking an increased fine, since it is not the firm that has been convicted in the

other market. This strategy, like the previous one, eliminates the risk of increased fines. However, like the previous strategy, it has the disadvantage of not exploiting potential synergies during one of the phases of the game. For this strategy, it is during the first phase of the game that firms do not benefit from synergies.

In the last phase of the game, the conglomerate's discounted profit is equal to Π_2^C. In the second phase of the game, the conglomerate's discounted profit is equal to:

$$\Pi_1^{IC} = \frac{\frac{17}{72}a^2 - (2-\lambda)f - \rho F + \delta\rho\Pi_2^C}{1-\delta(1-\rho)}$$

For monopoly prices to be sustainable during this phase, we need:

$$F \leq F_1^{IC} \equiv \frac{17\delta(1-\rho)-9}{576\delta(1-\rho)\rho}a^2$$

In the first phase of the game, the group's discounted profit is given by:

$$\Pi_0^{IC} = \frac{\frac{2}{8}a^2 - 2f + 2\rho(1-\rho)\delta\Pi_1^{IC} + \rho^2\delta\Pi_2^C - 2\rho F}{1-\delta(1-\rho)^2}$$

An independent firm has an interest in respecting the collusion agreement in the first phase if and only if:

$$F \leq F_0^{IC} \equiv \frac{17\delta(1-\rho)-9}{576\delta(1-\rho)\rho}a^2 - \frac{[1-\delta(1-\rho)](1-\rho)}{\left[1-\delta(1-\rho)^2\right]\rho}\frac{\lambda f}{2}$$

If $\lambda f = 0$, $F_1^{IC} = F_0^{IC}$. If $\lambda f > 0$, $F_1^{IC} > F_0^{IC}$. This strategy is therefore sustainable if and only if: $F \leq F_0^{IC}$. The existence of potential synergies weakens collusion in the first phase of the collusion agreement.

4 Ranking of sustainability thresholds

The main problem of this article concerns the choice of group organization. However, the impact of group organization on the potential for collusion is also an interesting issue. In this section, we seek to clarify the conditions under which multi-market contacts facilitate or weaken collusion.

If we assume $1-2\rho-\delta(1-2\rho+\rho^2) \geq 0$, then the three relevant thresholds are F_1^{CC}, F_1^{CI} and F_0^{IC}.

The clearest comparison is between F_1^{CI} and F_0^{IC}. If $\lambda f = 0$, $F_0^{IC} = F_1^{CI}$. If $\lambda f > 0$, we always have: $F_0^{IC} \geq F_1^{CI}$.[8] It is easier to sustain monopoly prices with the (I,C,C) strategy than with the (C,I,C) strategy. With both strategies, the phase when collusion is most difficult to sustain is when the groups are organized as two independent firms, because during this phase the groups do not benefit from synergies if they respect the collusion agreement, but do benefit from them after a deviation. The (I,C,C) agreement is more stable, because if firms deviate in the first phase of the game, they lose the opportunity to benefit from collusion in the second phase of the game. This acts as a deterrent. A deviation therefore enables synergies to be exploited earlier, but has the disadvantage of eliminating the phase when firms can benefit from both synergies and collusion.

[8] Indeed, if $\lambda f > 0$ then $F_0^{IC} \geq F_1^{CI} \Leftrightarrow \rho \geq 0$.

The ranking of F_1^{CC} and the other two thresholds depends on the values of θ and λf:

$$F_1^{CC} \geq F_1^{CI} \quad \Leftrightarrow \quad \frac{\lambda f}{2} \geq \left(1 - \frac{1}{\theta}\right) \frac{17\delta(1-\rho) - 9}{576\delta(1-\rho)} a^2$$

$$F_1^{CC} \geq F_0^{IC} \quad \Leftrightarrow \quad \frac{[1-\delta(1-\rho)](1-\rho)}{1-\delta(1-\rho)^2} \frac{\lambda f}{2} \geq \left(1 - \frac{1}{\theta}\right) \frac{17\delta(1-\rho) - 9}{576\delta(1-\rho)} a^2$$

If $\lambda f = 0$ and $\theta = 1$, we have: $F_1^{CC} = F_1^{CI} = F_0^{IC}$. In the absence of increased fines for recidivism and synergies, the conditions of sustainability of the three collusion strategies are identical. This is the result of Bernheim and Whinston (1990): if the different markets are identical, multi-market contacts have no impact on collusion possibilities.

If $\lambda f = 0$ and $\theta > 1$, we have: $F_1^{CC} < F_1^{CI} = F_0^{IC}$. An increase in the fine in the event of a repeat offence undermines the collusion strategy which maintains multi-market contacts throughout the collusion period. The increased fine introduces a link between the two markets. When firms have been convicted in one market, the fine incurred in the other market increases, making collusion more fragile. Strategies consisting of separating the two activities during one phase of the collusion are easier to implement than the strategy of maintaining multi-market contacts throughout the collusion cycle.

If $\lambda f > 0$ and $\theta = 1$, we have: $F_1^{CC} > F_0^{IC} \geq F_1^{CI}$. The existence of synergies between the two activities has no effect on the sustainability of the (C, C, C) strategy, but it reduces the possibilities of sustaining monopoly prices with the other two collusion strategies. If groups separate their activities into independent firms, the potential synergies reduce the scope for collusion, since they increase punishment profits without altering collusion profits.

If $\lambda f > 0$ and $\theta > 1$, we have two opposite effects. The synergies make the (C, I, C) and (I, C, C) agreements more difficult to sustain, while the increase in the fine makes the (C, C, C) strategy more difficult to support. The ranking of the different collusion thresholds depends on which effect dominates, and therefore on the values of the different parameters.

In the remainder of this article, we assume that δ is sufficiently high and F is sufficiently low for monopoly prices to be sustainable with all three collusion strategies. To better visualize this set, the different sustainability thresholds in (δ, F) space are shown below, for values: $a = 20$, $\lambda = 0.5$, $f = 1$, $\rho = 0.01$ and $\theta = 2$.

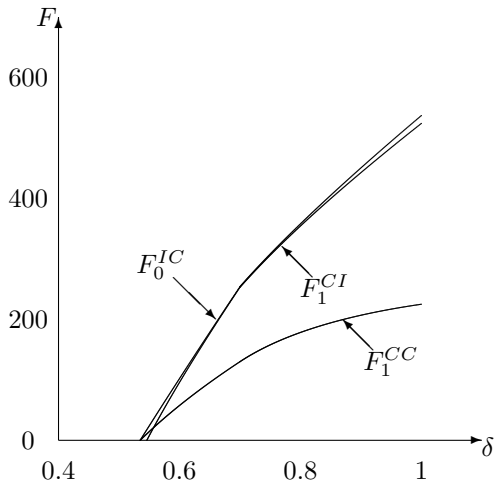


Figure 1: Sustainability thresholds for different collusion strategies

5 Organization choices

We can now analyze the groups' choice of organization. We restrict ourselves to values of δ and F such that monopoly prices are sustainable with the three available collusion strategies. We therefore assume $F \leq min(F_1^{CI}, F_1^{CC})$.

A firm's choice of organization determines whether or not it benefits from potential synergies, and whether it is a repeat offender. We have assumed that the allocation of production quotas between firms does not depend on their organization. The organizational choice of one group therefore has no impact on the profits of the other. The organization choices of each group are therefore independent and do not depend on the organization chosen by the other group. We have:

$$\begin{aligned} \Pi_0^{CC} \geq \Pi_0^{CI} &\Leftrightarrow \lambda f \geq (\theta - 1)\,\rho F \\ \Pi_0^{CC} \geq \Pi_0^{IC} &\Leftrightarrow \lambda f \geq \frac{2\delta\,(1-\rho)\,\rho}{1-\delta\,(1-\rho)}\,(\theta - 1)\,\rho F \end{aligned}$$

The (C, C, C) strategy is preferable to the other collusion strategies available, if synergies are high and the fine increase for recidivism is low.

The term δ does not appear in the comparison between Π_0^{CC} and Π_0^{CI}, as the advantages of each of these two strategies only appear during the second phase of the game. They are therefore contemporaneous, and their comparison does not depend on the discount factor. On the other hand, the relative advantages of the (C, C, C) and (I, C, C) strategies do not appear at the same time. The (C, C, C) strategy generates higher profits in the first phase of the game, allowing synergies to be exploited, while the (I, C, C) strategy eliminates the increased fine in the second phase of collusion. As the benefits of the two strategies are time-lagged, the discount factor appears in their comparison. An increase in δ favors (I, C, C) over (C, C, C). More impatient firms (with a lower δ) prefer the strategy whose benefits become apparent sooner.

What remains is to compare the (C, I, C) and (I, C, C) strategies. These two strategies have the same

advantage: they eliminate the increase of the fine during the second phase of collusion. They have the same disadvantage: having to forego potential synergies during one of the collusion phases. This disadvantage does not materialize at the same time for both strategies. It occurs earlier if firms choose (I, C, C). It comes into play later if firms opt for (C, I, C), but lasts longer in expectation.[9] Formally, we have:

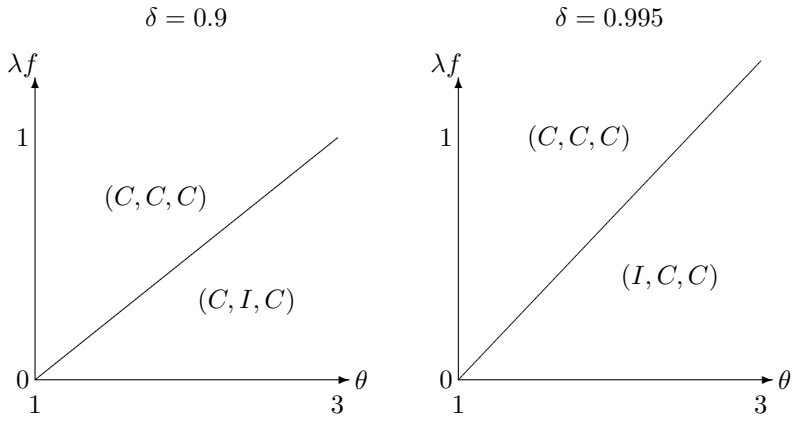
$$\Pi_0^{CI} \geq \Pi_0^{IC} \Leftrightarrow 1 \geq \delta(1+2\rho)(1-\rho)$$

Firms prefer (I, C, C) if δ is very close to 1 and (C, I, C) if δ is lower. A decrease in ρ favors the (C, I, C) strategy over (I, C, C). If ρ is low, the first phase lasts (in expectation) longer. Therefore, the second phase occurs (in expectation) later. If $\delta < 1$, this reduces the weighting of second-phase profits relative to first-phase profits, leading firms to favor (C, I, C) over (I, C, C).

The following proposition summarizes the main results:

Proposition 1 *Firms choose (C, C, C) when synergies are strong. They opt for the (I, C, C) strategy if synergies are low and δ is very high. Firms select the (C, I, C) strategy if synergies are low and δ is not close to 1.*

These results are best visualized using the graph below. We set $\rho = 0.01$ and $F = 50$ and chose two different values for δ.



Figures 2 and 3: Group organization according to θ.

If we want to get all three strategies on the same graph, we can move to another space. In the space $(\rho, \lambda f)$, with the values $\delta = 0.95$, $F = 50$ and $\theta = 1.5$, we obtain the following figure.

[9] This is because, in the first phase, the competition authority can uncover any of the agreements. Whereas in the second phase, the competition authority can only uncover a single agreement. The second phase therefore lasts (in expectation) longer than the first. The expected duration of the second phase is $\frac{1}{\rho}$, while the expected duration of the first phase is $\frac{1}{(2-\rho)\rho}$.

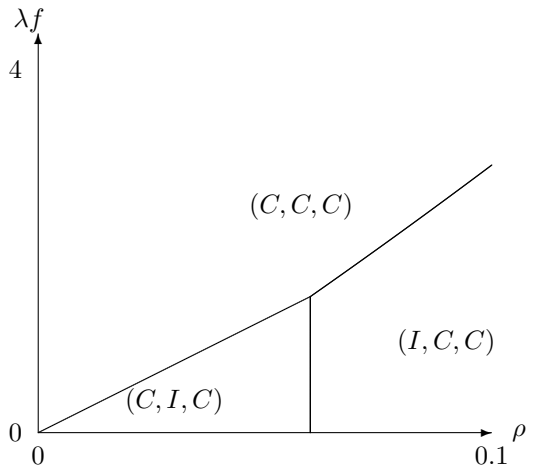


Figure 4: Group organization according to ρ

Overall, stricter competition policy (higher F, ρ or θ) encourages groups to temporarily split up their activities into several independent firms so that they can collude without incurring increased fines for repeat offences.

6 Discussion

The results established in the previous section have several implications, which we develop in this section.

The first is that, in industries where synergies are low but positive, diversified firms will tend to alter their boundaries after a cartel conviction if the legislation provides for a large increase in fines for repeat offenders. If firms follow the (C, I, C) strategy, a first cartel conviction is followed by the sale of certain activities or by a spin-off. Conversely, if firms follow the (I, C, C) strategy, a first conviction will lead to a merger in which the firm that has just been convicted will be absorbed by another firm. A merger will also occur after a second conviction if the firms play the (C, I, C) strategy. In this situation, the firm that has just been condemned may be the acquirer or the target.

The second implication is that the link often made between multi-market contacts and increased opportunities for collusion needs to be qualified. The literature has often presented the existence of multi-market contacts as a factor facilitating collusion.[10] In this study, while the increase in fines incurred in the event of recidivism is substantial, multi-market contacts weaken the possibility of collusion between firms. It is rather the splitting up of conglomerates into several stand-alone firms, despite the existence of synergies, that should be viewed with suspicion by competition authorities. In particular, competition authorities should look into activities divested by a conglomerate in the months following the opening of an investigation for participation in a cartel targeting other activities of this conglomerate.

It has been argued that the wave of conglomerate mergers in the USA in the 1960s and 1970s was linked

[10] Edwards (1955), Bernheim and Whinston (1990), Spagnolo (1999), Pénard (2000) and Matsushima (2001).

to the strict antitrust policies of the time (Shleifer and Vishny, 1991).[11] Competition authorities severely restricted the scope for firms to carry out external growth operations in their own industry. This would have encouraged firms to expand into other industries in order to continue growing. In this study, competition policy also has an impact on the formation of conglomerates. However, this impact does not come from merger control, but from anti-cartel policy. The relationship predicted by this study is non-monotonic. In the absence of an anti-cartel policy (i.e. if $\rho = 0$), groups organize themselves into conglomerates to benefit from synergies between their activities. If ρ increases, the groups can temporarily split into autonomous firms to eliminate the increased fine on their second conviction. A tightening of anti-cartel policy is therefore leading to the dissolution of certain conglomerates. If ρ becomes very high, the groups give up implementing collusion agreements. In this case, they revert to conglomerate organizations. The intensification of the fight against cartels may therefore have contributed to the refocusing of firms in the USA and Europe from the 1980s onwards. On the other hand, conglomerates are more common in Asia, notably in Japan and Korea, where antitrust policy is less stringent. Conglomerates are making a comeback in the digital industries. Alphabet, Meta or Amazon have quite diversified activities. This resurgence of conglomerates, in industries that are increasingly targeted by competition authorities, can be explained by particularly strong synergies, enabled in particular by the sharing of databases.

As competition policy can have an effect on group organization, competition authorities should take this into account in their anti-cartel strategy. In this study, the impact of collusion on consumer surplus is the same for all three collusion strategies. The choice of collusion strategy has no impact on either collusion prices or the duration of collusion. The only impact of collusion strategy is on firms' costs. The (C, C, C) strategy is therefore socially preferable to the (C, I, C) and (I, C, C) strategies. However, a tightening of competition policy may lead to a shift from the (C, C, C) strategy to one of the other two collusion strategies. Consequently, if the competition authority cannot choose values for ρ and F high enough to totally deter collusion, it may have an interest in reducing θ or F to encourage colluding groups to minimize their production costs by adopting a conglomerate organization. This recommendation may be sensitive to modeling assumptions. It is reinforced if there is a positive probability, when groups are organized in conglomerates, that the competition authorities will discover the second cartel by serendipity during an investigation targeting a first cartel. This hypothesis was analyzed by Jacques (2023). Encouraging groups to adopt a conglomerate form not only reduces firms' production costs, but also reduces the expected duration of collusion by creating a probability that the second cartel will be discovered much sooner. If synergies covered conglomerates' variable costs, and not just their fixed costs, collusion prices would be lower when firms opt for the (C, C, C) strategy. Encouraging groups to adopt a conglomerate form would therefore be beneficial for consumers. Conversely, if the goods sold on the two markets were substitutes, as in Dargaud and Jacques (2015, 2020a, 2020b), collusion prices would be higher with conglomerates than with independent firms. The opposite result could then be obtained. Social surplus could be lower when groups opt for the (C, C, C) strategy. It would then be advisable to increase F or θ to encourage groups to split up during one of the collusion phases.

[11] Matsusaka (1996) attempted to test this hypothesis empirically and found little support for it.

7 Conglomerate discount

A widely debated issue in the literature on conglomerates is their perception and valuation by financial markets. Conglomerates create internal capital markets. It is possible to finance the investments of a fast-growing, but still low-profitability division, by drawing on the cash flows generated by divisions operating in mature markets, which offer high profits but low growth prospects. Joining a conglomerate enables a firm that would otherwise have faced financial constraints limiting its development to increase its investments. This is the bright side of internal capital markets (Stein, 1997). However, conglomerates can also have a dark side. The internal allocation of available capital can give rise to power struggles within conglomerates. The final allocation of investments may reflect the balance of power between managers in the various divisions rather than the profitability of the projects proposed by these divisions (Scharfstein and Stein, 2000; Rajan, Servaes and Zingales, 2000). This can lead to significant inefficiencies in the investments made.

Some authors have attempted to empirically settle the question of conglomerate efficiency by matching each of the conglomerate's divisions with a focus firm operating in the same business and of the same size, and then comparing the conglomerate's stock market value with the sum of the values of the various matched stand-alone firms. Lang and Stulz (1994) and Berger and Ofek (1995) observed that the value of conglomerates was 10 to 15% lower than the recomposed value when matching comparable stand-alone firms. These two studies were followed by many others.[12] Some supported previous findings by replicating them in other periods or countries. Others criticized certain aspects of the methodology. Campa and Kedia (2002), Maksimovic and Phillips (2002) and Gomes and Livdan (2004) have pointed out that the existence of conglomerates was the result of certain firms choosing to diversify, while other firms chose not to. One of the shortcomings of previous studies is that they consider firm organization to be exogenous, whereas in fact it is endogenous. Stand-alone firms considered as comparable are therefore probably not always so, which biases the estimates. These studies argue that even if conglomerates are at a discount to focus firms operating in the same sectors, this does not mean that conglomerates are inefficient. Firms that chose to diversify or were absorbed by conglomerates often had different characteristics to those that remained independent. It is therefore possible that conglomerates trade at a discount, but are nevertheless efficient.

In this study, we analyzed the choice between conglomerates and stand alone firms. It therefore seems interesting to see whether the results obtained can predict the existence of a conglomerate discount, even though conglomerate organization is more efficient if we restrict ourselves to production costs alone.

In the zone where groups choose the (I, C, C) strategy, an econometric study would observe a conglomerate discount. Stand-alone firms are those that have never been convicted of collusion and are therefore able, for a few more periods, to sustain the monopoly price. Conglomerates are firms that have been convicted at least once, and whose collusion capabilities have been reduced or eliminated. Focus firms therefore appear more profitable and better valued on stock markets than conglomerates.

In the area where groups choose the (C, I, C) strategy, results may vary depending on the sample.

[12] For a survey, see Maksimovic and Phillips (2013).

Conglomerates are more profitable than stand-alone firms if they are in the first phase of the game, but less profitable if they are in the third phase. If the first phase is shorter than the third phase, there should be more conglomerates in phase 3 than in phase 1, and a conglomerate discount should be observed.

If we were to introduce into the model firms that cannot collude (for example, because they have a low δ), the conglomerate discount would be reinforced. Firms that cannot collude adopt a conglomerate form. Groups that choose to organize themselves into two independent firms are necessarily groups that participate in at least one collusion agreement. Some conglomerates can also collude, but if those that cannot collude represent a high enough proportion of firms, then a conglomerate discount should appear.

8 Conclusion

In this study, we focused on the impact of increased fines for repeat offenders on firm organization. It has been shown that, if synergies between the different activities of a conglomerate are limited, it may be in the conglomerate's interest to split into several independent firms when it engages in collusion practices on several markets. Once the collusion is over, the conglomerates reconstitute themselves to benefit from synergies.

One of the implications of this theory is that multi-market contacts do not necessarily increase the risk of collusion. On the contrary, it is the break-up of conglomerates between several independent firms, despite the existence of synergies, that should arouse the suspicion of competition authorities. A change in firm boundaries following a conviction for participation in a cartel is also a signal that the firms are potentially involved in a second agreement on another market.

The theory developed in this article may also help explain the conglomerate discount observed in numerous empirical studies comparing conglomerate valuations with those of stand-alone firms perceived as similar to conglomerate divisions. Conglomerates are less likely to be involved in collusion agreements than focus firms. They may therefore appear less profitable than stand-alone firms operating in comparable markets. The valuation of conglomerates on the stock market may therefore be lower than that of seemingly similar focus firms. However, this discount is not a sign that conglomerates are inefficient.

These results are based on a number of assumptions. However, they may persist if certain assumptions are modified. Quantity competition could be replaced by price competition with differentiated goods without affecting results.[13] If synergies concerned firms' variable costs rather than their fixed costs, solving the model would be more complex,[14] but the fundamental trade-off between synergies and the elimination of the fine surcharge would remain the same. We would therefore still have parameter values for which groups would choose to split temporarily. An important assumption is that collusion cannot resume in a market where it has been dissolved. If this assumption were to be modified, the dynamics of group organization could become

[13] All that is needed is for goods to be sufficiently differentiated for profits, when firms compete with each other, to cover the firms' fixed costs.

[14] In particular, the determination of the collusion agreement when the two groups have chosen different organizations, as monopoly prices would no longer be identical for both groups.

more complex. A demerger after a first conviction would still be worthwhile, as it would limit the risk of a fine increase to a single market. Once again, we would see a reunification of the two activities following the conviction of collusion on the two markets, as the firms would then be considered recidivists in the event of a new conviction, irrespective of their organization. The dynamics obtained in this study would therefore be preserved for certain parameter values. The dynamics of group organization could, however, become more complex if the size of the fine increase depended on the number of previous convictions. Firms could remain separate even after convictions on both markets, if, for example, a third conviction is punished more severely than a second. In this study, it was also assumed that group reorganization costs were zero. If they were significant, group organization would be more inertial. In particular, the organization could be chosen at the start of the game and not change, if these costs were very high. Groups would choose to organize themselves into conglomerates when synergies are high, and into independent firms when synergies are low and the increase in the fine for recidivism is high. Intermediate reorganization costs would allow groups to evolve their organization over the course of the game. They would probably have the effect of favoring the (I, C, C) strategy over the (C, I, C) strategy, because the former involves only one organizational change, as opposed to two for the latter.

This study focused on the impact of increased fines for repeat offenders on firm organization. In future research, it would be interesting to look at the optimal treatment of recidivism. In this study, it was pointed out that an increase in the fine surcharge could have a counter-productive effect by encouraging groups to adopt an organization with higher costs. In a richer model, the fine increase could also have positive effects. In particular, the literature on the economic analysis of crime has shown that it is desirable to increase the fine for repeat offenders if miscarriages of justice can occur (Chu, Hu and Huang, 2000), if individuals have doubts about the legality of their behavior (Friehe, 2009) or if criminals learn to better conceal their crimes (Mungan, 2010). Introducing one of these elements into the model is an interesting avenue for future research. This model also assumes that recidivism is perpetual, in the sense that the fine is increased in the event of recidivism, even if the previous conviction is very old. It would be interesting to introduce a time limit beyond which recidivism would no longer be taken into account in the event of a new conviction. This delay could encourage firms to temporarily halt collusion on the second market and wait for the delay to elapse before resuming it. This idea will be analyzed in future research.

9 Appendices

9.1 Some results of the Cournot competition

A firm's best reply to its competitor's production on a market is equal to: $q_i(q_j) = \frac{1}{2}(a - q_j)$.

If firms compete on a market, each produces $q_i = \frac{1}{3}a$. The equilibrium price is then equal to $p = \frac{1}{3}a$. Each firm makes a profit (excluding fixed costs) equal to $\frac{1}{9}a^2$.

If firms collude, they share the production that a monopoly would choose. Each firm produces $q_i = \frac{1}{4}a$. The equilibrium price is then equal to $p = \frac{1}{2}a$. Each firm makes a profit (excluding fixed costs and the risk of fines) equal to $\frac{1}{8}a^2$.

If a firm decides to deviate from this agreement, its optimal deviation output is equal to $\frac{3}{8}a$. The equilibrium price in the event of deviation is equal to $p = \frac{3}{8}a$. The profit (excluding fixed costs and the risk of fines) of the deviating firm is equal to $\frac{9}{64}a^2$.

9.2 (C, C, C) Strategy

In the second phase of the game, collusion has been dissolved in one market, but continues in the other. The conglomerate's discounted profit, if the agreement is respected, is equal to:

$$\Pi_1^{CC} = \frac{1}{9}a^2 + \frac{1}{8}a^2 - (2-\lambda)f - \rho\theta F + \delta(1-\rho)\Pi_1^{CC} + \delta\rho\Pi_2^C$$

$$\Leftrightarrow \Pi_1^{CC} = \frac{\frac{17}{72}a^2 - (2-\lambda)f - \rho\theta F + \delta\rho\frac{1}{1-\delta}\left[\frac{2}{9}a^2 - (2-\lambda)f\right]}{1-\delta(1-\rho)}$$

In the event of deviation, the conglomerate obtains a discounted profit equal to:

$$\Pi_1^{dCC} = \frac{9}{64}a^2 + \frac{1}{9}a^2 - (2-\lambda)f - \rho\theta F + \delta\Pi_2^C$$

The conglomerate has an interest in complying with the collusion agreement, in the second phase of the game, if and only if:

$$\Pi_1^{CC} \geq \Pi_1^{dCC} \Leftrightarrow F \leq F_1^{CC} \equiv \frac{17\delta(1-\rho) - 9}{576\delta(1-\rho)\rho\theta}a^2$$

In the first phase of the game, the conglomerates collude on both markets. If the collusion agreement is respected, the conglomerate's discounted profit is given by:

$$\Pi_0^{CC} = \frac{2}{8}a^2 - (2-\lambda)f + \delta(1-\rho)^2\Pi_0^{CC} + 2\rho(1-\rho)\left(\delta\Pi_1^{CC} - F\right) + \rho^2\left(\delta\Pi_2^C - 2F\right)$$

$$\Leftrightarrow \Pi_0^{CC} = \frac{\frac{2}{8}a^2 - (2-\lambda)f + 2\rho(1-\rho)\delta\Pi_1^{CC} + \rho^2\delta\Pi_2^C - 2\rho F}{1-\delta(1-\rho)^2}$$

If it deviates from the agreement, the conglomerate obtains a discounted profit equal to:

$$\Pi_0^{dCC} = 2\frac{9}{64}a^2 - (2-\lambda)f - 2\rho F + \delta\Pi_2^C$$

The conglomerate has an interest in complying with the collusion agreement, during the first phase of the game, if and only if:

$$\Pi_0^{CC} \geq \Pi_0^{dCC} \Leftrightarrow F \leq F_0^{CC} \equiv \frac{\left[1-\delta\left(1-\rho\right)^2\right]\left[17\delta(1-\rho)-9\right]}{576\left[\rho(\theta-1)+1-\delta\left(1-\rho\right)^2\right]\delta\left(1-\rho\right)\rho}a^2$$

9.3 (C, I, C) Strategy

In the second phase of collusion, the firms are independent. The firm considering whether or not to deviate is only interested in its own profit, and not in the impact of its choice on the profit of the other firm in the group. We need to distinguish between firms that can still collude and those that can no longer. For the firm that can still collude, we have:

$$\Pi_{1c}^{CI} = \frac{1}{8}a^2 - f - \rho F + \delta\left(1-\rho\right)\Pi_{1c}^{CI} + \delta\rho\frac{\Pi_2^C}{2} \Leftrightarrow \Pi_{1c}^{CI} = \frac{\frac{1}{8}a^2 - f - \rho F + \delta\rho\frac{\Pi_2^C}{2}}{1-\delta\left(1-\rho\right)}$$

Expected profit of a firm, if it chooses to deviate:

$$\Pi_{1c}^{dCI} = \frac{9}{64}a^2 - f - \rho F + \delta\frac{\Pi_2^C}{2}$$

It is in the firm's interest to respect the collusion agreement in the second phase if and only if:

$$\Pi_{1c}^{CI} \geq \Pi_{1c}^{dCI} \Leftrightarrow F \leq F_1^{CI} \equiv \frac{17\delta\left(1-\rho\right)-9}{576\delta\left(1-\rho\right)\rho}a^2 - \frac{\lambda f}{2\rho}$$

The profit expectancy of the firm that can no longer collude is equal to:

$$\Pi_{1nc}^{CI} = \frac{1}{9}a^2 - f + \delta\left(1-\rho\right)\Pi_{1nc}^{CI} + \delta\rho\frac{\Pi_2^C}{2} \Leftrightarrow \Pi_{1nc}^{CI} = \frac{\frac{1}{9}a^2 - f + \delta\rho\frac{\Pi_2^C}{2}}{1-\delta\left(1-\rho\right)}$$

In the second phase of the game, the sum of the discounted profits of the two independent firms is therefore equal to:

$$\Pi_1^{CI} = \frac{\frac{17}{72}a^2 - 2f - \rho F + \delta\rho\Pi_2^C}{1-\delta\left(1-\rho\right)}$$

In the first phase of the game, the group's discounted profit is given by:

$$\Pi_0^{CI} = \frac{2}{8}a^2 - (2-\lambda)f + \delta\left(1-\rho\right)^2\Pi_0^{CI} + 2\rho\left(1-\rho\right)\left(\delta\Pi_1^{CI} - F\right) + \rho^2\left(\delta\Pi_2^C - 2F\right)$$

$$\Leftrightarrow \Pi_0^{CI} = \frac{\frac{2}{8}a^2 - (2-\lambda)f + 2\rho\left(1-\rho\right)\delta\Pi_1^{CI} + \rho^2\delta\Pi_2^C - 2\rho F}{1-\delta\left(1-\rho\right)^2}$$

If a conglomerate deviates, its expected profit is equal to:

$$\Pi_0^{dCI} = 2\frac{9}{64}a^2 - (2-\lambda)f - 2\rho F + \delta\Pi_2^C$$

A conglomerate has an interest in complying with the collusion agreement, in the second phase, if and only if:

$$\Pi_0^{CI} \geq \Pi_0^{dCI} \Leftrightarrow F \leq F_0^{CI} \equiv \frac{\left[17\delta(1-\rho)-9\right]\frac{a^2}{576}}{\delta\left(1-\rho\right)\rho} - \frac{\lambda f}{1-\delta\left(1-\rho\right)^2}$$

9.4 (I, C, C) Strategy

In the second phase of the game, a conglomerate's discounted profit is equal to:

$$\Pi_1^{IC} = \frac{17}{72}a^2 - (2-\lambda)f - \rho F + \delta(1-\rho)\Pi_1^{IC} + \delta\rho\Pi_2^C$$

$$\Leftrightarrow \Pi_1^{IC} = \frac{\frac{17}{72}a^2 - (2-\lambda)f - \rho F + \delta\rho\Pi_2^C}{1-\delta(1-\rho)}$$

A conglomerate's expected profit if it chooses to deviate from the agreement:

$$\Pi_1^{dIC} = \frac{9}{64}a^2 + \frac{1}{9}a^2 - (2-\lambda)f - \rho F + \delta\Pi_2^C$$

A conglomerate has an interest in respecting the collusion agreement, in the second phase, if and only if:

$$\Pi_1^{IC} \geq \Pi_1^{dIC} \Leftrightarrow F \leq F_1^{IC} \equiv \frac{17\delta(1-\rho)-9}{576\delta(1-\rho)\rho}a^2$$

In the first phase of the game, a group's discounted profit is given by:

$$\begin{aligned} \Pi_0^{IC} &= \frac{2}{8}a^2 - 2f + \delta(1-\rho)^2\Pi_0^{IC} + 2\rho(1-\rho)\left(\delta\Pi_1^{IC} - F\right) + \rho^2\left(\delta\Pi_2^C - 2F\right) \\ \Leftrightarrow \Pi_0^{IC} &= \frac{\frac{2}{8}a^2 - 2f + 2\rho(1-\rho)\delta\Pi_1^{IC} + \rho^2\delta\Pi_2^C - 2\rho F}{1-\delta(1-\rho)^2} \end{aligned}$$

The profit expectancy of each firm in the group is therefore equal to:

$$\frac{1}{2}\Pi_0^{IC} = \frac{\frac{1}{8}a^2 - f - \rho F + \rho(1-\rho)\delta\Pi_1^{IC} + \rho^2\delta\frac{1}{2}\Pi_2^C}{1-\delta(1-\rho)^2}$$

Profit expectancy of a firm if it deviates:

$$\Pi_0^{dIC} = \frac{9}{64}a^2 - f - \rho F + \delta\frac{\Pi_2^C}{2}$$

A firm has an interest in respecting the collusion agreement in the first phase if and only if:

$$\frac{1}{2}\Pi_0^{IC} \geq \Pi_0^{dIC} \Leftrightarrow F \leq F_0^{IC} \equiv \frac{17\delta(1-\rho)-9}{576\delta(1-\rho)\rho}a^2 - \frac{[1-\delta(1-\rho)](1-\rho)}{\left[1-\delta(1-\rho)^2\right]\rho}\frac{\lambda f}{2}$$

References

[1] Bageri V., Y. Katsoulacos and G. Spagnolo (2013), The distortive effects of antitrust fines based on revenue, *Economic Journal*, 123 (572), 545-557.

[2] Berger P.G. and E. Ofek (1995), Diversification's effect on firm value, *Journal of Financial Economics*, 37 (1), 39-65.

[3] Bernheim D. and M. Whinston (1990), Multimarket contact and collusive behavior, *Rand Journal of Economics*, 21 (1), 1-26.

[4] Campa J.M. and S. Kedia (2002), Explaining the diversification discount, *Journal of Finance*, 57 (4), 1731-1762.

[5] Chu C.Y.C., S.C. Hu and T.Y. Huang (2000), Punishing repeat offenders more severely, *International Review of Law and Economics*, 20 (1), 127-140.

[6] Dargaud E. and A. Jacques (2015), Hidden collusion by decentralization: firm organization and antitrust policy, *Journal of Economics*, 114 (2), 153-176.

[7] Dargaud E. and A. Jacques (2020a), Leniency programs and cartel organization of multiproduct firms, *Review of Law and Economics*, 16 (3), 1-39.

[8] Dargaud E. and A. Jacques (2020b), Slowdown antitrust investigations by decentralization, *GATE WP 2017*.

[9] Edwards C. (1955), Conglomerate bigness as a source of power, in: NBER (ed.) *Business concentration and price policy*, Princeton, Princeton University Press, 331-359.

[10] Friehe T. (2009), Escalating penalties for repeat offenders: a note on the role of information, *Journal of Economics*, 97 (2), 165-183.

[11] Gomes J. and D. Livdan (2004), Optimal diversification: reconciling theory and evidence, *Journal of Finance*, 59 (2), 507-535.

[12] Green E. and R. Porter (1984), Noncooperative collusion under imperfect price information, *Econometrica*, 52 (1), 87-100.

[13] Jacques A. (2023), Dynamique des conglomérats et politique antitrust, *Revue d'économie politique*, 133 (6), 997-1038.

[14] Lang L. and R. Stulz (1994), Tobin's q, corporate diversification, and firm performance, *Journal of Political Economy*, 102 (6), 1248-1280.

[15] Maksimovic V. and G. Phillips (2002), Do conglomerate firms allocate resources inefficiently across industries? Theory and evidence, *Journal of Finance*, 57 (2), 721-767.

[16] Maksimovic V. and G. Phillips (2013), Conglomerate firms, internal capital markets, and the theory of the firm, *Annual Review of Financial Economics*, 5 (1), 225-244.

[17] Matsusaka J. (1996), Did tough antitrust enforcement cause the diversification of american corporations?, *Journal of Financial and Quantitative Analysis*, 31 (2), 283-294.

[18] Matsushima H. (2001), Multimarket contact, imperfect monitoring, and implicit collusion, *Journal of Economic Theory*, 98 (1), 158-178.

[19] Mungan M. (2010), Repeat offenders: if they learn, we punish them more severely, *International Review of Law and Economics*, 30 (2), 173-177.

[20] Pénard T. (2000), Délégation ou centralisation des décisions: l'impact sur la collusion, *Revue économique*, 51 (1), 5-26.

[21] Rajan R., H. Servaes and L. Zingales (2000), The cost of diversity: the diversification discount and inefficient investment, *Journal of Finance*, 55 (1), 35-80.

[22] Scharfstein D. and J. Stein (2000), The dark side of internal capital markets: divisional rent-seeking and inefficient investment, *Journal of Finance*, 55 (6), 2537-2564.

[23] Shleifer A. and R. Vishny (1991), Takeovers in the'60s and the'80s: evidence and implications, *Strategic Management Journal*, 12 (S2), 51-59.

[24] Spagnolo G. (1999), On interdependent supergames: multimarket contact, concavity, and collusion, *Journal of Economic Theory*, 89 (1), 127-139.

[25] Stein J. (1997), Internal capital markets and the competition for corporate resources, *Journal of Finance*, 52 (1), 111-133.

[26] Thomas C. and R. Willig (2006), The risk of contagion from multimarket contact, *International Journal of Industrial Organization*, 24 (6), 1157-1184.

TEPP Working Papers 2024

24-5. The valuation of energy efficiency labels in the French housing market
Sylvain Chareyron

24-4. A comprehensive analysis of production efficiency : a tax reform perspective
Laurence Jacquet, Etienne Lehmann

24-3. How to measure energy poverty in warm and cold climate territories? A multidimensional approach
Manitra Rakotomena, Olivia Ricci

24-2. Innovating for the good or for the bad. An EU-wide analysis of the impact of technological transformation on job polarisation and unemployment
Ylenia Curci, Nathalie Greenan, Silvia Napolitano

24-1. Is training helpful in boosting the self-confidence and professional integration of young people not in employment, education or training? Results from a randomized experiment
Nicolas Moreau, Alexis Parmentier, Mylène Lebon-Eyquem

TEPP Working Papers 2023

23-8. Dornbusch's overshooting and the systematic component of monetary policy in SOE-SVAR
Nicolas Groshenny, Naveed Javed

23-7. Is participatory democracy in line with social protest? Evidence from French yellow vests movement
Benjamin Monnery, François-Charles Wolff

23-6. On-the-job search, life-cycle training and the role of transfer fees
Arnaud Cheron, Anthony Terriau

23-5. Estimating the laffer tax rate on capital income : cross-base responses matter!
Marie-Noëlle Lefebvre, Etienne Lehmann, Michaël Sicsic

23-4. The trickle-down theory: a reality in French sports?
Florian Moussi-Beylie

23.3. Robotization and unbalanced changes in high-skill employment
Lucas Parmentier

23.2. Knowledge transmission in the second part of careers: does formal training matter?
Pierre-Jean Messe, Nathalie Greenan

23-1. Phantom cycles
Arnaud Chéron, Bruno Decreuse

TEPP Working Papers 2022

22-21. Utility services poverty : addressing the problem of household deprivation in Mayotte
Dorothée Charlier, Bérangère Legendre, Olivia Ricci

22-20. The effects of disability benefits on the employment of low-skilled youth : evidence from France
Sylvain Chareyron, Naomie Mahmoudi

22-19. Does gender equality bargaining reduce child penality? Evidence from France
Pierre-Jean Messe, Jérémy Tanguy

22-18. The effect of pro diversity actions on discrimination in the recruitment of large companies : a field experiment
Laetitia Challe, Sylvain Chareyron, Yannick L'Horty, Pascale Petit

22-17. Impacts of quota policy and employer obligation to adapt workstations on discrimination against people with disabilities : lesson from an experiment
Sylvain Chareyron, Yannick L'Horty, Philomene Mbaye, Pascale Petit

22-16. Are real merchandise imports per capita a good predictor for the standard of living for the small island world : testing for the imports-led growth and the growth-led imports hypotheses in panels over the period 1970-2019
Jean-François Hoarau, Nicolas Lucic

22-15. Extracting the discrimination components from the callback rates
Emmanuel Duguet, Loïc Du Parquet, Pascale Petit

22-14. Strategic debt in a mixed duopoly: the limited liability effect
Armel Jacques

22-13. Short-time work policies during the COVID-19 pandemic
Julien Albertini, Xavier Fairise, Arthur Poirier, Anthony Terriau

22-12. Immigration and labour market flows
Andri Chassamboulli, Idriss Fontaine, Ismael Galvez-Iniesta

22-11. Short-term impact of tropical cyclones in Madagascar : evidence from nightlight data
Idriss Fontaine, Sabine Garabedian, Maël Jammes

22-10. The current and future costs of tropical cyclones: A case study of La Réunion
Idriss Fontaine, Sabine Garabedian, Helene Veremes

22-9. Wealth and income responses to dividend taxation : Evidence from France
Marie-Noëlle Lefebvre, Eddy Zanoutene

22-8. Soccer labour market equilibrium and efficient training of talents
Marnix Amand, Arnaud Chéron, Florian Pelgrin, Anthony Terriau

22.7. Using short-term jobs as a way to fin a regular job. What kind of role for local context?
Fabrice Gilles, Sabina Issehnane, Florent Sari

22-6. Gender and age diversity. Does it matter for firms' productivity?
Laetitia Challe, Fabrice Gilles, Yannick L'Horty, Ferhat Mihoubi

22-5. How wages respond to the job-finding and job-to-job transition rates? Evidence from New Zealand administrative data
Christopher Ball, Nicolas Groshenny, Özer Karagedikli, Murat Özbilgind, Finn Robinsona

22-4. Endogenous timing of technological choices of flexibility in a mixed duopoly
Armel Jacques

22-3. Reducing ethnic discrimination through formal warning : evidence from two combined field experiments
Sylvain Chareyron, Yannick L'Horty, Souleymane Mbaye, Pascale Petit

22-2. Cream skimming and Discrimination in access to medical care: a field experiment
Sylvain Chareyron, Yannick L'horty, Pascale Petit

22-1. Optimal taxation with multiple incomes and types
Kevin Spiritus, Etienne Lehmann, Sander Renes, Floris T. Zoutman

TEPP Working Papers 2021

21-11. Intermittent collusive agreements : antitrust policy and business cycles
Emilie Dargaud, Armel Jacques

21-10. Endogenous breadth of collusive agreements : an application to flexible technological choices
Emilie Dargaud, Armel Jacques

21-9. How to tax different incomes?
Laurence Jacquet, Etienne Lehmann

21-8. Does optimal capital taxation under stochastic returns to savings
Eddy Zanoutene

21-7. Does the gender mix influence collective bargaining on gender equality? Evidence from France
Anne-Sophie Bruno, Nathalie Greenan, Jérémy Tanguy

21-6. The effects of the non-financial component of business accelerators
Fabrice Gilles, Yannick L'Horty, Ferhat Mihoubi

21-5. Organisational changes and long term sickness absence and injury leave
Mohamed Ali Ben Halima, Nathalie Greenan, Joseph Lanfranchi

21-4. The unexplored discriminations towards youth : equal access to goods and services
David Gray, Yannick L'Horty, Souleymane Mbaye, Pascale Petit

21-3. The zero effect of income tax on the timing of birth: some evidence on French data
Nicolas Moreau

21-2. Tropical cyclones and fertility : new evidence from Madagascar
Idriss Fontaine, Sabine Garabedian, David Nortes-Martinez, Hélène Vérèmes

21-1. On the heterogeneous impacts of the COVID-19 lockdown on US unemployment
Malak Kandoussi, François Langot

TEPP Working Papers 2020

20-8. COVID-19 mortality and health expenditures across European countries: The positive correlation puzzle
Serge Blondel, Radu Vranceanu

20-7. Measuring discrimination in the labour market
Emmanuel Duguet

20-6. The effects of age on educational performances at the end of primary school: cross-sectional and regression discontinuity approach applications from Reunion Island
Daniel Rakotomalala

20-5. Slowdown antitrust investigations by decentralization
Emilie Dargaud, Armel Jacques

20-4. Is international tourism responsible for the pandemic of COVID19? A preliminary cross-country analysis with a special focus on small islands
Jean-François Hoarau

20-3. Does labor income react more to income tax or means tested benefit reforms?
Michaël Sicsic

20-2. Optimal sickness benefits in a principal-agent model
Sébastien Ménard

20-1. The specific role of agriculture for economic vulnerability of small island spaces
Stéphane Blancard, Maximin Bonnet, Jean-François Hoarau

TEPP Working Papers 2019

19-8. The impact of benefit sanctions on equilibrium wage dispersion and job vacancies
Sebastien Menard

19-7. Employment fluctuations, job polarization and non-standard work: Evidence from France and the US
Olivier Charlot, Idriss Fontaine, Thepthida Sopraseuth

19-6. Counterproductive hiring discrimination against women: Evidence from French correspondence test
Emmanuel Duguet, Loïc du Parquet, Yannick L'Horty, Pascale Petit

19-5. Inefficient couples: Non-minimization of the tax burden among French cohabiting couples
Olivier Bargain, Damien Echevin, Nicolas Moreau, Adrien Pacifico

19-4. Seeking for tipping point in the housing market: evidence from a field experiment
Sylvain Chareyron, Samuel Gorohouna, Yannick L'Horty, Pascale Petit, Catherine Ris

19-3. Testing for redlining in the labor market
Yannick L'Horty, Mathieu Bunel, Pascale Petit

19-2. Labour market flows: Accounting for the public sector
Idriss Fontaine, Ismael Galvez-Iniesta, Pedro Gomes, Diego Vila-Martin

19-1. The interaction between labour force participation of older men and their wife: lessons from France
Idriss Fontaine

TEPP Working Papers 2018

18-15. Be healthy, be employed: a comparison between the US and France based on a general equilibrium model
Xavier Fairise, François Langot, Ze Zhong Shang

18-14. Immigrants' wage performance in the routine biased technological change era: France 1994-2012
Catherine Laffineur, Eva Moreno-Galbis, Jeremy Tanguy, Ahmed Tritah

18-13. Welfare cost of fluctuations when labor market search interacts with financial frictions
Elini Iliopulos, François Langot, Thepthida Sopraseuth

18-12. Accounting for labor gaps
François Langot, Alessandra Pizzo

18-11. Unemployment fluctuations over the life cycle
Jean-Olivier Hairault, François Langot, Thepthida Sopraseuth

18-10. Layoffs, Recalls and Experience Rating
Julien Albertini, Xavier Fairise

18-9. Environmental policy and health in the presence of labor market imperfections
Xavier Pautrel

18-8. Identity mistakes and the standard of proof
Marie Obidzinski, Yves Oytana

18-7. Presumption of innocence and deterrence
Marie Obidzinski, Yves Oytana

18-6. Ethnic Discrimination in Rental Housing Market: An Experiment in New Caledonia
Mathieu Bunel, Samuel Gorohouna, Yannick L'Horty, Pascale Petit, Catherine Ris

18-5. Evaluating the impact of firm tax credits. Results from the French natural experiment CICE
Fabrice Gilles, Yannick L'Horty, Ferhat Mihoubi, Xi Yang

18-4. Impact of type 2 diabetes on health expenditure: an estimation based on individual administrative data
François-Olivier Baudot , Anne-Sophie Aguadé,Thomas Barnay, Christelle Gastaldi-Ménager, Anne Fargot-Campagna

18-3. How does labour market history influence the access to hiring interviews?
Emmanuel Duguet, Rémi Le Gall, Yannick L'Horty, Pascale Petit

18-2. Occupational mobility and vocational training over the life cycle
Anthony Terriau

18-1. Retired, at last? The short-term impact of retirement on health status in France
Thomas Barnay, Eric Defebvre

TEPP Working Papers 2017

17-11. Hiring discrimination against women: distinguishing taste based discrimination from statistical discrimination
Emmanuel Duguet, Loïc du Parquet, Pascale Petit

17-10. Pension reforms, older workers' employment and the role of job separation and finding rates in France
Sarah Le Duigou, Pierre-Jean Messe

17-9. Healthier when retiring earlier? Evidence from France
Pierre-Jean Messe, François-Charles Wolff

17-8. Revisting Hopenhayn and Nicolini's optimal unemployment insurance with job search monitoring and sanctions
Sebastien Menard, Solenne Tanguy

17-7. Ethnic Gaps in Educational Attainment and Labor-Market Outcomes: Evidence from France
Gabin Langevin, David Masclet, Fabien Moizeau, Emmanuel Peterle

17-6. Identifying preference-based discrimination in rental market: a field experiment in Paris
Mathieu Bunel, Yannick L'Horty, Loïc du Parquet, Pascale Petit

17-5. Chosen or Imposed? The location strategies of households
Emilie Arnoult, Florent Sari

17-4. Optimal income taxation with composition effects
Laurence Jacquet, Etienne Lehmann

17-3. Labor Market Effects of Urban Riots: an experimental assessment
Emmanuel Duguet, David Gray, Yannick L'Horty, Loic du Parquet, Pascale Petit

17-2. Does practicing literacy skills improve academic performance in first-year university students? Results from a randomized experiment
Estelle Bellity, Fabrices Gilles, Yannick L'Horty

17-1. Raising the take-up of social assistance benefits through a simple mailing: evidence from a French field experiment
Sylvain Chareyron, David Gray, Yannick L'Horty

TEPP Working Papers 2016

16-8. Endogenous wage rigidities, human capital accumulation and growth
Ahmed Tritah

16-7. Harder, better, faster...yet stronger? Working conditions and self-declaration of chronic diseases
Eric Defebvre

16-6. The influence of mental health on job retention
Thomas Barnay, Eric Defebvre

16-5. The effects of breast cancer on individual labour market outcomes: an evaluation from an administrative panel
Thomas Barnay, Mohamed Ali Ben Halima, Emmanuel Duguet, Christine Le Clainche, Camille Regaert

16-4. Expectations, Loss Aversion, and Retirement Decisions in the Context of the 2009 Crisis in Europe
Nicolas Sirven, Thomas Barnay

16-3. How do product and labor market regulations affect aggregate employment, inequalities and job polarization? A general equilibrium approach
Julien Albertini, Jean-Olivier Hairault, François Langot, Thepthida Sopraseuth

16-2. Access to employment with age and gender: results of a controlled experiment Laetitia Challe, Florent Fremigacci, François Langot, Yannick L'Horty, Loïc Du Parquet, Pascale Petit

16-1. An evaluation of the 1987 French Disabled Workers Act: Better paying than hiring
Thomas Barnay, Emmanuel Duguet, Christine Le Clainche, Yann Videau

TEPP Working Papers 2015

15-10. Optimal Income Taxation with Unemployment and Wage Responses: A Sufficient Statistics Approach
Kory Kroft, Kavan Kucko, Etienne Lehmann, Johannes Schmieder

15-9. Search frictions and (in) efficient vocational training over the life-cycle
Arnaud Chéron, Anthony Terriau

15-8. Absenteeism and productivity: the experience rating applied to employer contributions to health insurance
Sébastien Ménard, Coralia Quintero Rojas

15-7. Take up of social assistance benefits: the case of homeless
Sylvain Chareyron

15-6. Spatial mismatch through local public employment agencies. Answers from a French quasi-experiment
Mathieu Bunel, Elisabeth Tovar

15-5. Transmission of vocational skills at the end of career: horizon effect and technological or organisational change
Nathalie Greenan, Pierre-Jean Messe

15-4. Protecting biodiversity by developing bio-jobs: A multi-branch analysis with an application on French data
Jean De Beir, Céline Emond, Yannick L'Horty, Laetitia Tuffery

15-3. Profit-Sharing and Wages: An Empirical Analysis Using French Data Between 2000 and 2007
Noélie Delahaie, Richard Duhautois

15-2. A meta-regression analysis on intergenerational transmission of education: publication bias and genuine empirical effect
Nicolas Fleury, Fabrice Gilles

15-1. Why are there so many long-term unemployed in Paris?
Yannick L'Horty, Florent Sari

TEPP Working Papers 2014

14-14. Hiring discrimination based on national origin and the competition between employed and unemployed job seekers
Guillaume Pierné

14-13. Discrimination in Hiring: The curse of motorcycle women
Loïc Du Parquet, Emmanuel Duguet, Yannick L'Horty, Pascale Petit

14-12. Residential discrimination and the ethnic origin: An experimental assessment in the Paris suburbs
Emmanuel Duguet, Yannick L'Horty, Pascale Petit

14-11. Discrimination based on place of residence and access to employment
Mathieu Bunel, Yannick L'Horty, Pascale Petit

14-10. Rural Electrification and Household Labor Supply: Evidence from Nigeria
Claire Salmon, Jeremy Tanguy

14-9. Effects of immigration in frictional labor markets: theory and empirical evidence from EU countries
Eva Moreno-Galbis, Ahmed Tritah

14-8. Health, Work and Working Conditions: A Review of the European Economic Literature
Thomas Barnay

14-7. Labour mobility and the informal sector in Algeria: a cross-sectional comparison (2007-2012)
Philippe Adair, Youghourta Bellache

14-6. Does care to dependent elderly people living at home increase their mental health?
Thomas Barnay, Sandrine Juin

14-5. The Effect of Non-Work Related Health Events on Career Outcomes: An Evaluation in the French Labor Market
Emmanuel Duguet, Christine le Clainche

14-4. Retirement intentions in the presence of technological change: Theory and evidence from France
Pierre-Jean Messe, Eva Moreno-Galbis, Francois-Charles Wolff

14-3. Why is Old Workers' Labor Market more Volatile? Unemployment Fluctuations over the Life-Cycle
Jean-Olivier Hairault, François Langot, Thepthida Sopraseuth

14-2. Participation, Recruitment Selection, and the Minimum Wage
Frédéric Gavrel

14-1. Disparities in taking sick leave between sectors of activity in France: a longitudinal analysis of administrative data
Thomas Barnay, Sandrine Juin, Renaud Legal

TEPP Working Papers 2013

13-9. An evaluation of the impact of industrial restructuring on individual human capital accumulation in France (1956-1993)
Nicolas Fleury, Fabrice Gilles

13-8. On the value of partial commitment for cooperative investment in buyer-supplier relationship
José de Sousa, Xavier Fairise

13-7. Search frictions, real wage rigidities and the optimal design of unemployment insurance
Julien Albertini, Xavier Fairise

13-6. Tax me if you can! Optimal nonlinear income tax between competing governments
Etienne Lehmann, Laurent Simula, Alain Trannoy

13-5. Beyond the labour income tax wedge: The unemployment-reducing effect of tax progressivity
Etienne Lehmann, Claudio Lucifora, Simone Moriconi, Bruno Van Der Linden

13-4. Discrimination based on place of residence and access to employment
Mathieu Bunel, Emilia Ene Jones, Yannick L'Horty, Pascale Petit

13-3. The determinants of job access channels: evidence from the youth labor market in France
Jihan Ghrairi

13-2. Capital mobility, search unemployment and labor market policies: The case of minimum wages
Frédéric Gavrel

13-1. Effort and monetary incentives in Nonprofit et For-Profit Organizations
Joseph Lanfranchi, Mathieu Narcy

The TEPP Institute

The CNRS **Institute for Theory and Evaluation of Public Policies** (the TEPP Institute, FR n°2024 CNRS) gathers together research centres specializing in economics and sociology:

- L'**Equipe de Recherche sur l'Utilisation des Données Individuelles en lien avec la Théorie Economique** (Research Team on Use of Individuals Data in connection with economic theory), **ERUDITE**, University of Paris-Est Créteil, University of Gustave Eiffel;
- Le **Centre d'Etudes des Politiques Economiques** (Research Centre focused on the analysis of economic policy and its foundations and implications), **EPEE**, University of Evry Paris-Saclay ;
- Le **Centre Pierre Naville** (Research on Work and Urban Policies), **CPN**, University of Evry Paris-Saclay
- Le **Groupe d'Analyse des Itinéraires et des Niveaux Salariaux** (Group on Analysis of Wage Levels and Trajectories), **GAINS**, Le Mans University
- Le **Centre de Recherches en Economie et en Management**, (Research centre in Economics and Management), **CREM**, University of Rennes 1, University of Caen Basse-Normandie ;
- Le **Groupe de Recherche ANgevin en Économie et Management** (Angevin Research Group in Economics and Management), **GRANEM**, University of Angers ;
- Le **Centre de Recherche en Economie et Droit** (Research centre in Economics and Law) **CRED**, University of Paris II Panthéon-Assas ;
- Le **Laboratoire d'Economie et de Management Nantes-Atlantique** (Laboratory of Economics and Management of Nantes-Atlantique) **LEMNA**, Nantes University ;
- Le **Laboratoire interdisciplinaire d'étude du politique Hannah Arendt – Paris-Est**, **LIPHA-PE**, University of Paris-Est Créteil and University of Gustave Eiffel ;
- Le **Centre d'Economie et de Management de l'Océan Indien**, **CEMOI**, University of La Réunion ;
- Le **Laboratoire d'économie de Poitiers**, **LéP**, University of Poitiers ;
- L'UMR **Structures et marchés agricoles, ressources et territoires**, **SMART**, INRAE, Agro Rennes-Angers Institute ;
- Le **Centre de recherche en économie et en droit sur le développement insulaire**, **CREDDI**, University of the Antilles.

TEPP brings together 230 teacher-researchers and 100 doctoral students. It is both one of the main academic operators in the evaluation of public policies in France, and the largest multidisciplinary federation of research on work and employment. It responds to the demand for impact assessment of social programs using advanced technologies combining theoretical and econometric modeling, qualitative research techniques and controlled experiences.