Introduction à l'économie appliquée

Chapitre II
L'apport de l'économie expérimentale

Où l'on montre l'émergence de l'économie expérimentale, certaines expériences classiques liés à l'hypothèse de rationalité, et d'autres expériences liées aux idées de coordination.

Place de l'économie expérimentale

De nos jours, en Sciences Sociales, les expériences sont approchées comme une possibilité de tester des théories.

> *We can seldom test particular predictions in the social sciences by experiments explicitly designed to eliminate what are judged to be the most important disturbing influences" (Friedman, 1953, p.10).*

Plan du Cours : émergence de l'économie expérimentale

0 brève introduction d'une science naissante

1 Deux exemples historiques

2 Incursions dans le comportement individuel

3 (Re-)Analyse de la coordination

1. Deux exemples historiques

1. Le jeu de marché (à partir de Chamberlin)
2. Cohérence des choix individuels dans un contexte risqué (à partir d'Allais)

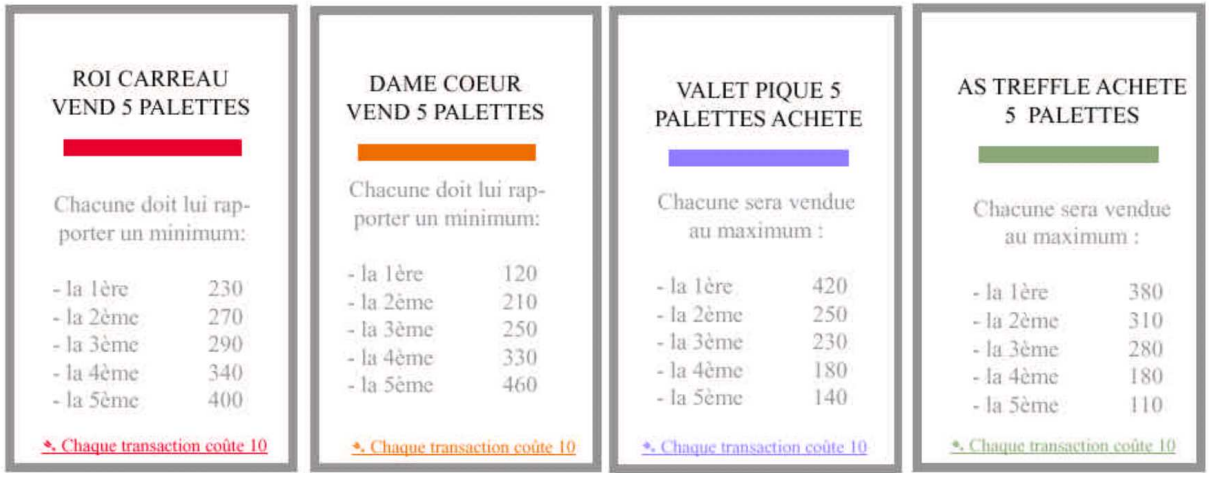
Jeu de marché

À la fin des années 1940, l'économiste Edward Chamberlin imagine un protocole pour illustrer le fonctionnement d'un marché en concurrence parfaite avec ses étudiants de l'université de Harvard.

Le but de cette expérience, est de donner la possibilité à des participants d'un jeu de plateau de réaliser des transactions, c-à-d d'échanger un (voire plusieurs) bien(s) à un prix donné, *puis*, d'analyser leurs transactions.

On distribue à des étudiants des cartes caractéristiques de vendeurs et d'acheteurs, les vendeurs étant caractérisés par un prix minimum de vente (assimilable à leur coût de production) et les acheteurs étant caractérisés par un prix maximum d'achat (assimilable à leur disposition à payer). *On étudie alors*, après avoir « ouvert les marchés » c'est-à-dire après avoir rendu possible des transactions de gré à gré entre n'importe quelle paire de vendeur et d'acheteur, *les transactions qui s'opèrent effectivement*.

Calculs économiques à effectuer avant de commencer



Pour la carte RK et pour la carte DC, calculer le prix moyen qu'il doit proposer pour des transactions individuelles et/ou groupées

Pour la carte VP et AT, calculer le prix moyen qu'il peut accepter pour des transactions individuelles et/ou groupées

Déroulement du jeu (en pratique, MAINTENANT)

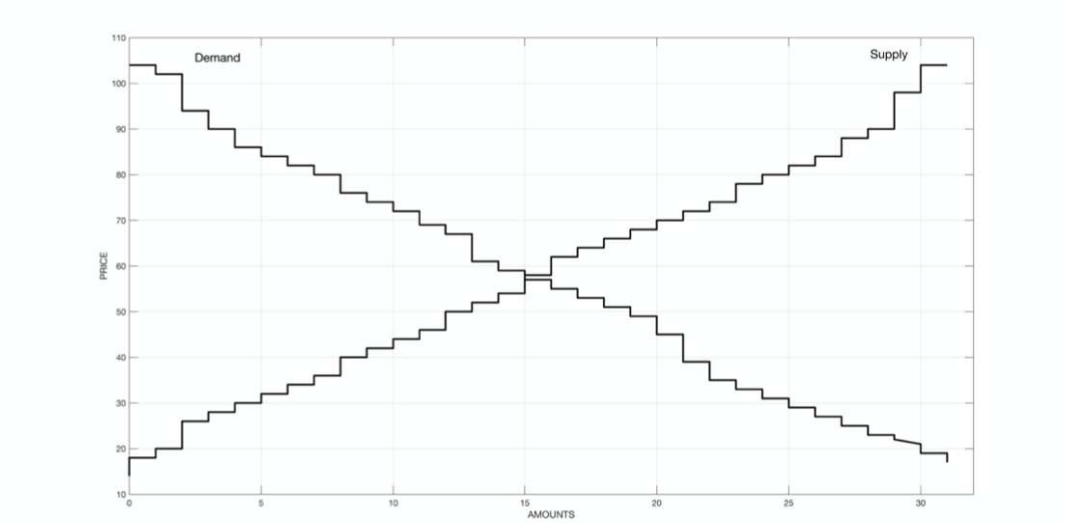
1	Répartition des étudiants en 3 groupes de 20 personnes,	Dans chacun de ces groupes, Il faut 2*8 joueurs et 2*2 comptables (qui répartissent les cartes)
2	Ouverture de deux marchéss DV et AR, par périodes de 3 minutes, cinq fois	Les transactions de 1 ou plusieurs unités de bien ne sont effectives que lorsqu'elles sont enregistrées auprès des comptables. Les comptables tiennent la comptabilité des transactions sous format tableau et sous format graphique.
3	Revue des transactions	Analyse des transparents
4	Ouverture du grand marché avec des marchands	5 rounds puis analyse

Questions et Analyse des Résultats

Comment les marchés fonctionnent-ils ?

Pour répondre à cette question, retour sur un peu de théorie.

FIGURE 1.2: MARKET EQUILIBRIUM IN CHAMBERLIN (1948) EXPERIMENT



Note. The figure shows the theoretical equilibrium of the market implemented in the laboratory—at the intersection of the (increasing) supply function and the (decreasing) demand function. *Source.* Chamberlin (1948, p. 97), Figure 1.

Sur l'axe horizontal les quantités, sur l'axe vertical, les dispositions à payer pour les acheteurs (la demande), les coûts marginaux pour les vendeurs (l'offre). Ecrire en 5 lignes ce que représentent le prix et la quantité qui équilibrent le marché.

Marché DV : Efficacité - Prix pour atteindre l'efficacité

Pour analyser l'efficacité, on cherche quels sont les biens achetés en premiers, par les acheteurs dont la disposition à payer est la plus grande, et les biiens vendus en premiers, par ordre d'efficacité (des moins couteux au plus couteux). Le marché est d'autant plus grand que les appariement peuvent se faire entre 1 acheteur dont la disposition à payer est plus grande que le coût de la firme offrant l'unité de bien. On trouve

VC	VP	VP	VT	VK	VK	VT	VK	VP	VP	VT	VP	
440	420	350	310	300	280	270	260	250	230	230	210	...
120	140	140	160	170	170	170	190	190	210	220	250	...
DC	DP	DT	DT	DP	DK	DT	DK	DT	DC	DP	DP	

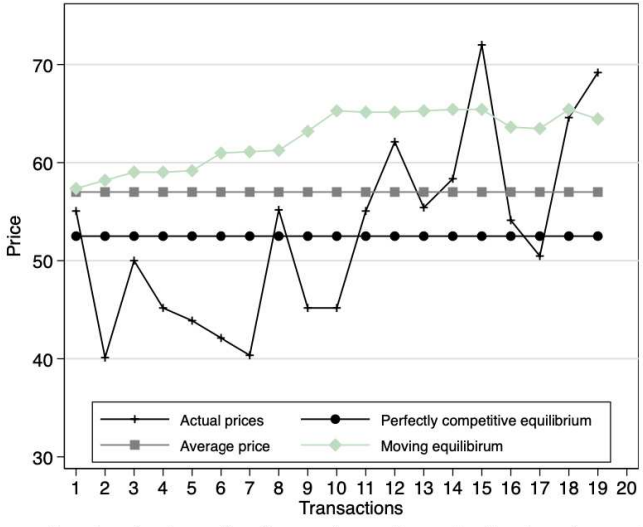
L'efficacité est donc obtenue sur ce marché en vendant 11 unités.

L'équilibre pourra s'obtenir pour un prix qui permettra à toutes les transactions de se faire, et en particulier la dernière : donc tout prix compris entre 220 et 230.

Moments d'analyse

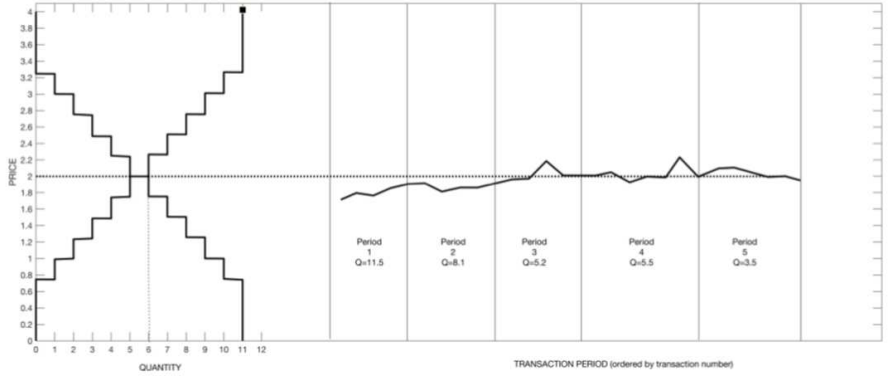
À gauche, l'analyse du jeu initial de Chamberlin, à droite, la réplication par Vernon Smith, plus proche du jeu que vous avez joué.

FIGURE 1.3: OBSERVED BEHAVIOUR IN CHAMBERLIN (1948) EXPERIMENT



For each transaction in abscissa, the figure shows the actual price observed in the experiment as a recall of the theoretical equilibrium described in Figure 1.2. *Source.* Chamberlin (1948, Figure 3.

FIGURE 1.4: PREDICTED AND OBSERVED BEHAVIOUR IN SMITH (1962) REPLICATIO



Note. The left-hand side figure shows the theoretical market equilibrium—at the intersection (increasing) supply function and the (decreasing) demand function. The right-hand side sho price and number of transactions in each market period. *Source.* Smith (1962, p.113), Figure

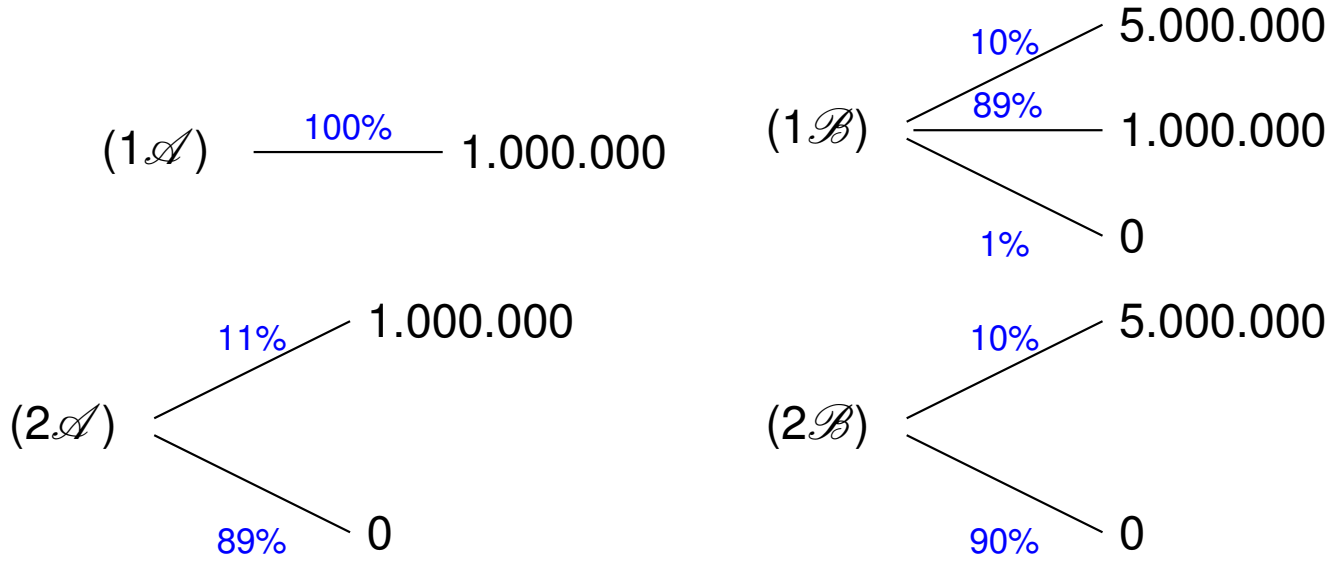
À votre avis, quel est le Jeu qui a le mieux fonctionné ?

Paradoxe d'Allais

Beaucoup d'expérience sont faites concernant les choix risqués des agents afin de comprendre leur aversion pour le risque.

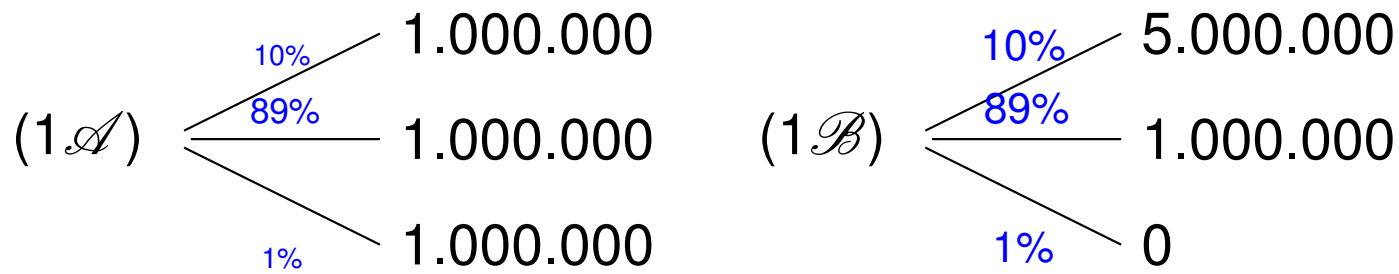
Certaines de ces expériences testent plus généralement la théorie de l'espérance d'utilité

Un agent, averse au risque est mis devant deux choix, il doit choisir entre les loteries 1A et 1B, et entre les loteries 2A et 2B, les loteries étant les suivantes :



Paradoxe d'Allais (suite)

En fait, si on considère 100 états de la nature, classés dans un ordre naturel, les choix précédents se présentent comme ci-après :



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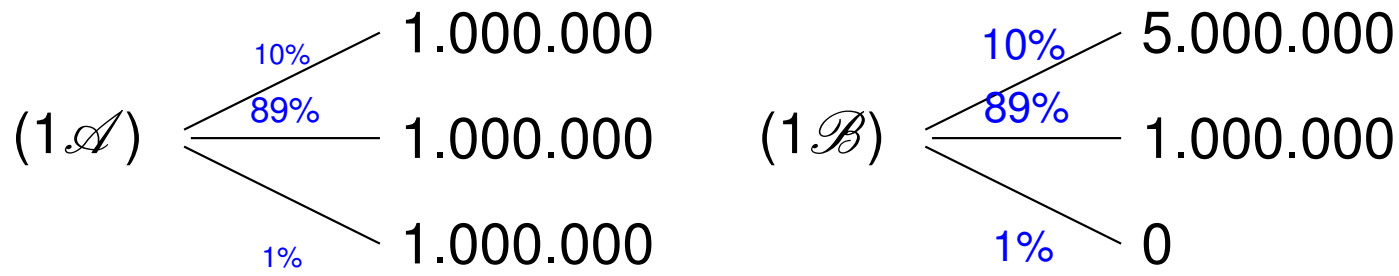

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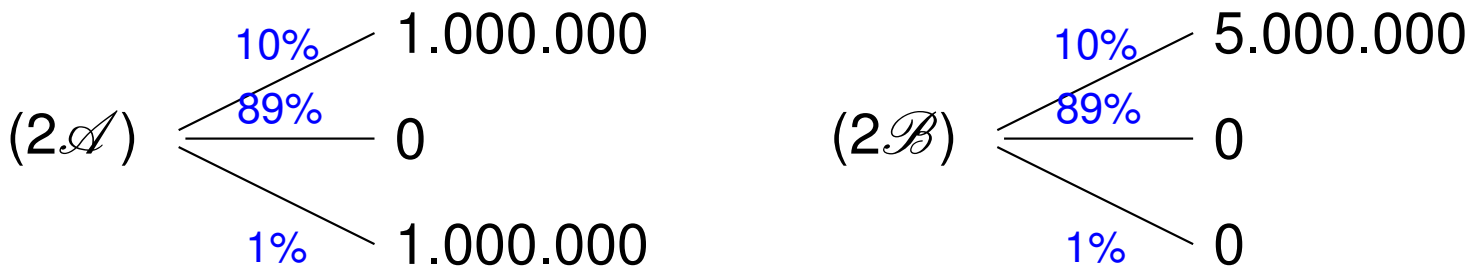
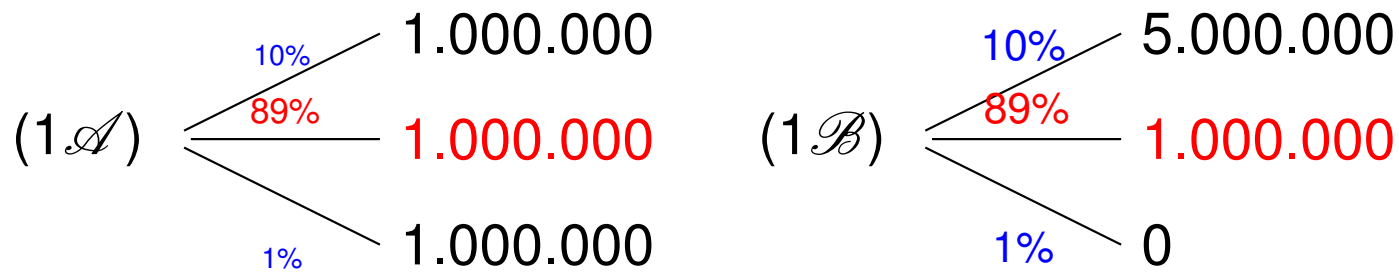


Allais (suite)

Reprenons les choix précédent, et mettons en lumière ce qui arrive dans les 89 états de la nature intermédiaires :



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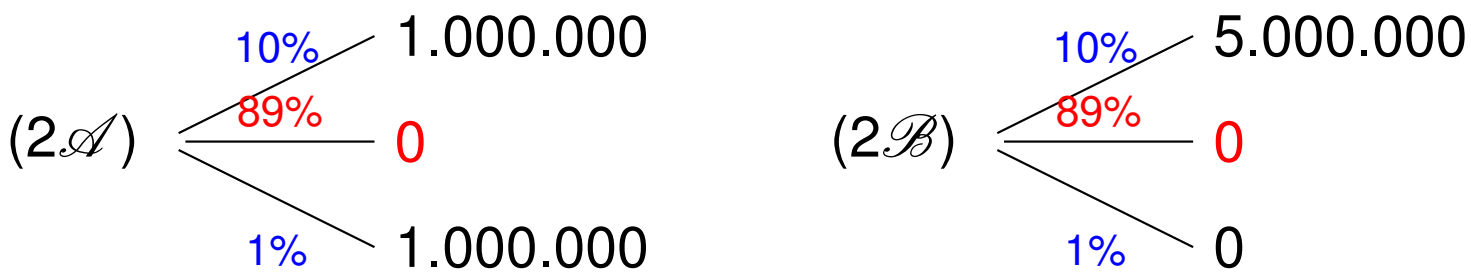


En fait, ce qui change dans les deux choix proposés, c'est ce que les prospects obtiennent dans les états de la nature intermédiaire. C'est ce qu'on pourrait appeler le contexte.

Allais (fin)

Si on postule un axiome « d'indépendance » quoi que pense l'individu du contexte, c'est-à-dire d'une certaine loterie (ici avoir 0 ou 1.000.000 avec certitude), considérée dans les états intermédiaires si on lui demande de la « mélanger » soit avec une loterie A soit avec une loterie B, avec une probabilité identique, dans les deux cas (A et B traduisent différemment l'incertitude sur les 11 états de la nature restants), on doit s'attendre à ce qu'il choisisse celle qu'il préfère, soit, celle qui contient A, soit celle qui contient B, indépendamment du contexte.

Ainsi, les prospects qui préfèrent la loterie $(1\mathscr{A})$ à la loterie $(1\mathscr{B})$ devraient préférer la loterie $(2\mathscr{A})$ à la loterie $(2\mathscr{B})$, et vice versa.

Ce n'est pas ce qui a été observé dans ce cours, et c'est le paradoxe qu'Allais a mis en évidence à une conférence de l'American Economic Society qui s'est tenue à New York en 1953 et divers articles publiés dans les années 1950.

Importance toujours plus grande de l'expérimental

The most drastic change was in fact the change in the kind of questions, which in the seventies and eighties, economics began to focus on, with a growing importance put on these two theoretical tools.2 In the middle of the twentieth century, economics was set in the context of a beautiful model of how the entire economy worked and how all the agents in the economy, as a group, made decisions in the present and for the future. This environment was so complex and all-encompassing that the empirical relevance of behavioural assumptions was obviously not a primary concern. But as economics moved away from this representation, more and more attention began to be given to the forces behind individual and strategic decision making.

2. Incursions dans les choix individuels

1. Rationalité individuelle et Hypothèse d'égoïsme
    1. Expérience du dictateur
    2. les pourboires
2. Consistence des choix individuels
    1. Expérience sur les Préférences révélées
    2. Expérience d'analyse du comportement d'animaux
3. Rationalité limitée
    1. Loisir et performance, offre de travail, myopie

Experience sur Homo economicus

Consider the following experiment performed by Elizabeth Hoffman, Kevin McCabe, Keith Shachak, and Vernon Smith.* Experimental subjects are brought into a laboratory and randomly assigned to one of two groups. One group is called the dividers and the other the receivers. Each divider is given 10 $ and randomly matched with one receiver whose identity he or she does not know. The divider is asked to split these ten dollars between himself and the randomly drawn receiver in any way he wants. He can keep it all for himself or he can give some to this other person. Do you think that college undergraduates would give any of this money away ? If so, does such behavior violate the assumptions associated with Homo economicus ? If instead of randomly being assigned to be a divider or a receiver subjects engaged in a contest ?say, solving puzzles ?with the winner being made the divider and the loser the receiver, would the mean amount offered go up ? Would the amount offered vary with the divider and receiver knowing each other's names ? Would the mean amount offered change if the experiment were double blind ?that is, neither the subjects nor the experimenter knew what any subject decided to give ? Stick around and we will give you the answers to these questions at the end of the chapter.

Experience sur Homo economicus

L'expérience précédente a été faite de nombreuses fois, et l'on s'aperçoit que les dividers donnent une partie des ressources qu'ils auraient pu garder pour eux.

- Ces dividers ont-ils des préférences compatibles avec les préférences de l'homo économicus ?

- Comment penser la variation de cette expérience où les dividers sont les gagnants d'une compétition entre les participants de l'expérience ?

- Comment penser la variation de cette expérience où les dividers sont observés ?

Contexte : Selfishness and non satiation-convexity of preferences

Our first psychological assumption is selfishness (égoïsme), that people are interested only in their own utility or satisfaction and make their choices with just that in mind. Hence, when people judge any allocation of goods for the economy, they look at it only in terms of how much they will receive from the allocation. While this assumption does not rule out sympathy for other human beings, it tells us that sympathy does not influence the decisions that people make.

Cette hypothèse est à la racine de l'analyse des comportements des agents économiques, et en particulier de la définition des préférences.

Il faut rajouter à l'égoisme l'hypothèse de non satiation qui signifie que plus un agent consomme, plus il a de bien-être.

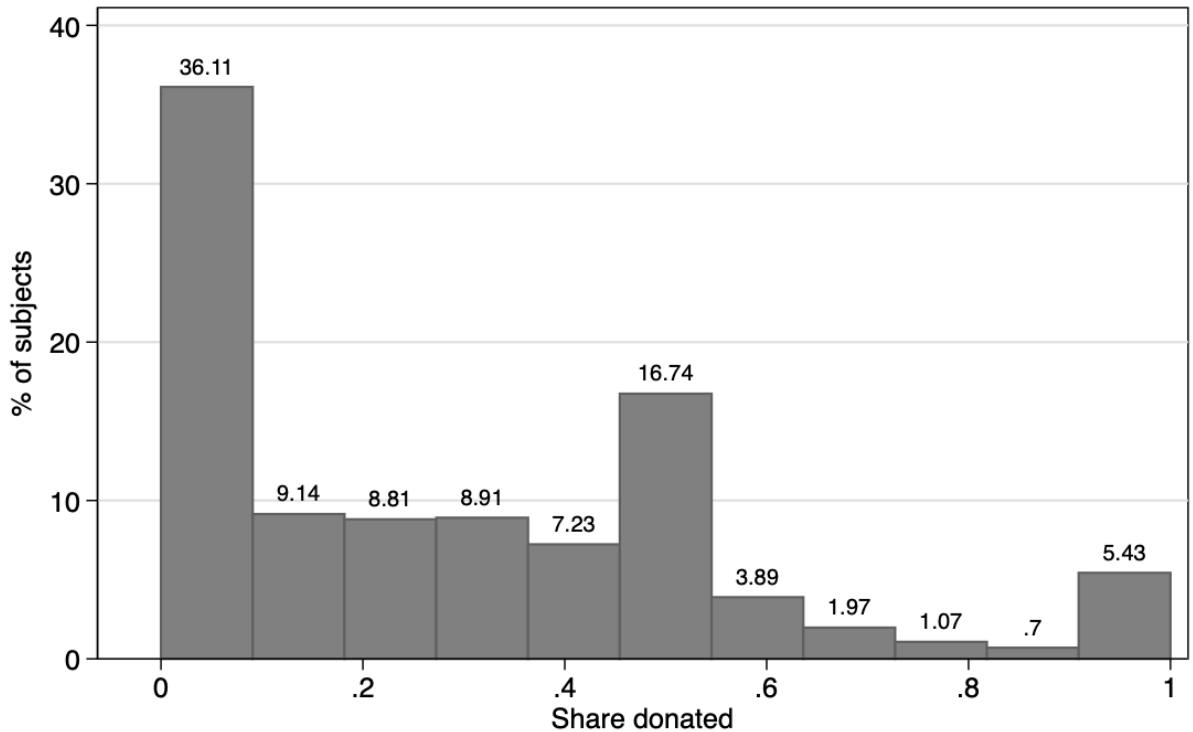
Prédictions du jeu

In Teaser 1 you were asked to imagine what you would do if you were the divider in the experiment where your task was to split $10 between you and an anonymous re- ceiver. You can imagine this game being played in several ways, as was done by researchers Hoffman, McCabe, Shachak, and Smith.

In one scenario, you simply come into the lab and are randomly allocated a position of receiver or divider and then play the game. In another, you and another student first compete for the right to be the divider by answering quiz questions, with the winner of the contest earning a “property right” to the favored divider position. In another set of treatments, the game is played in a double-blind manner rather than the typical single- blind way. In single-blind experiments, the divider’s identity would be hidden from the receiver but the experimenter (professor) would know what the divider gave his counterpart. In double-blind treatment, not only does the receiver not know who his divider was but neither does the experimenter, and that fact is known to the divider when he makes his or her division.

This game, called the Dictator game, has been played often with the surprising result that undergraduate student subjects tend to give significant portions of the $10 to their anonymous partners. I say surprising because this is not what economic theory, as we have postulated it, would predict. If people are selfish, they evaluate all alloca- tions only in terms of what they are getting. They do not care what others get. In addition, if they are nonsatiated, then the more they get, the better. If you put these two together, you get the prediction that no economic agent of the type we have described would give anything away. Yet they do. So what ?s wrong ?

FIGURE 4.1: META-ANALYSIS RESULTS: THE DICTATOR GAME



Note. Empirical distribution of the population of dictators observed in more than 300 published studies, according to the share of the initial endowment given by the dictator to the receiver. *Source.* Engel (2011, p.589), Figure 2.

Homo economicus III

The answer may be that real people in the real world are not actually selfish. They may have what are called “other-regarding preferences” that is, they may care what others, in addition to themselves, get. This possibility was explored by Ernst Fehr and Klaus Schmidt in “A Theory of Fairness, Competition and Cooperation,” (The Quarterly Journal of Economics, August 1999, pp. 817 ?68) and by Gary Bolton and Axel Ockenfels in “ERC : A Theory of Equity, Reciprocity and Competition” (American Economic Review 2000, 90, pp. 166-93). These authors posit a very simple idea, which they incorporate into a simple utility function. For example, in the Fehr-Schmidt paper, the idea is that people are averse to inequality of any form. If they get less than others, they feel envious, and if they get more, they feel guilty. If there are only two people in the world, person i and person j, then an inequality-averse person would have a utility function of the following type : $u_i(x_i) = x_i - a(x_j - x_i)$ if $x_j > x_i$ and $u_i(x_i) = x_i - b(x_i - x_j)$ if $x_i > x_j$, where $b \leq a$ (le terme de l’envie étant plus élevé celui de l’envie) and $0 \leq b \leq 1$. Note what this says. If there were no other person in the world and person I received x dollars, he would value it at x. However, if there were another person, J, then person I would look to see what J was getting. If person I was getting less than person J, person I’s utility would be decreased by the envy term, a, multiplied by the amount by which he was jealous. But if person I was getting more than person J, his utility would be decreased by the guilt term, b, multiplied by the amount of excess.

Homo economicus III - suite

- Quel est le maximum d'utilité à atteindre pour le divider, suivant ces préférences ?

si on note x ce qui reste au divider, et $10-x$, ce qu'il donne, on a à considerer deux programme optimal $\max_{x\geq 5} x - b(x-(10-x))$, et $\max_{x\leq 5} x - a((10-x)-x)$.

le premier programme se réécrit $\max_{x\geq 5}(1-2b)x+10b$,

le second $\max_{x\leq 5} x(1+2a)-10a$.

La solution du second programme est $x=5$ conduisant à l'utilité 5

La solution du premier programme dépend de b.

Si $b \leq ,5$, c'est x=10, conduisant à l'utilité $20(1-b) > 10$

Si $b \geq ,5$ c'est $x=5$, conduisant à l'utilité 5

Homo economicus III - suite

Obviously, this type of utility function would explain why some students give some money away, and how much they give away depends on the relationship be- tween their a's and b's. For any fixed level of income for themselves, they would prefer a world of equality, but if that is not possible, then they will tolerate inequality but only up to some point. Such people violate the selfishness axiom introduced earlier, but clearly such people exist. You probably are one of them.

Now back to the experimental teaser. The amount that the divider gives, in general, is significantly more than $0, but it depends on the treatment. For example, when the right to be the divider is allocated randomly, only 20% of subjects offer $0 to their anonymous receiver, with a similar proportion offering $5. When subjects have to compete for the right to be the divider, however, 40% offer $0, with another 40% offering $1 or $2. More amazing, when the experiment is done using a double-blind protocol, about 66% offer $0 or $1, while only 0.5% offer $5. This would seem to imply that we are actually more selfish deep down and are willing to show it when we think no one is looking or when we can find an excuse to justify it (like winning a contest).

Homo economicus III - Social distance

Une hypothèse pour continuer d'expliquer le dictator est que le don est lié à la distance sociale. Pour tester une telle explication, plusieurs version de l'expérience du dictateur ont été conduites, en « réduisant la distance sociale »

fhss-r est la version Répliquée du jeu du dictateur,

fhss-V est la même version expliquée avec des termes neutres, tel divider and receiver.

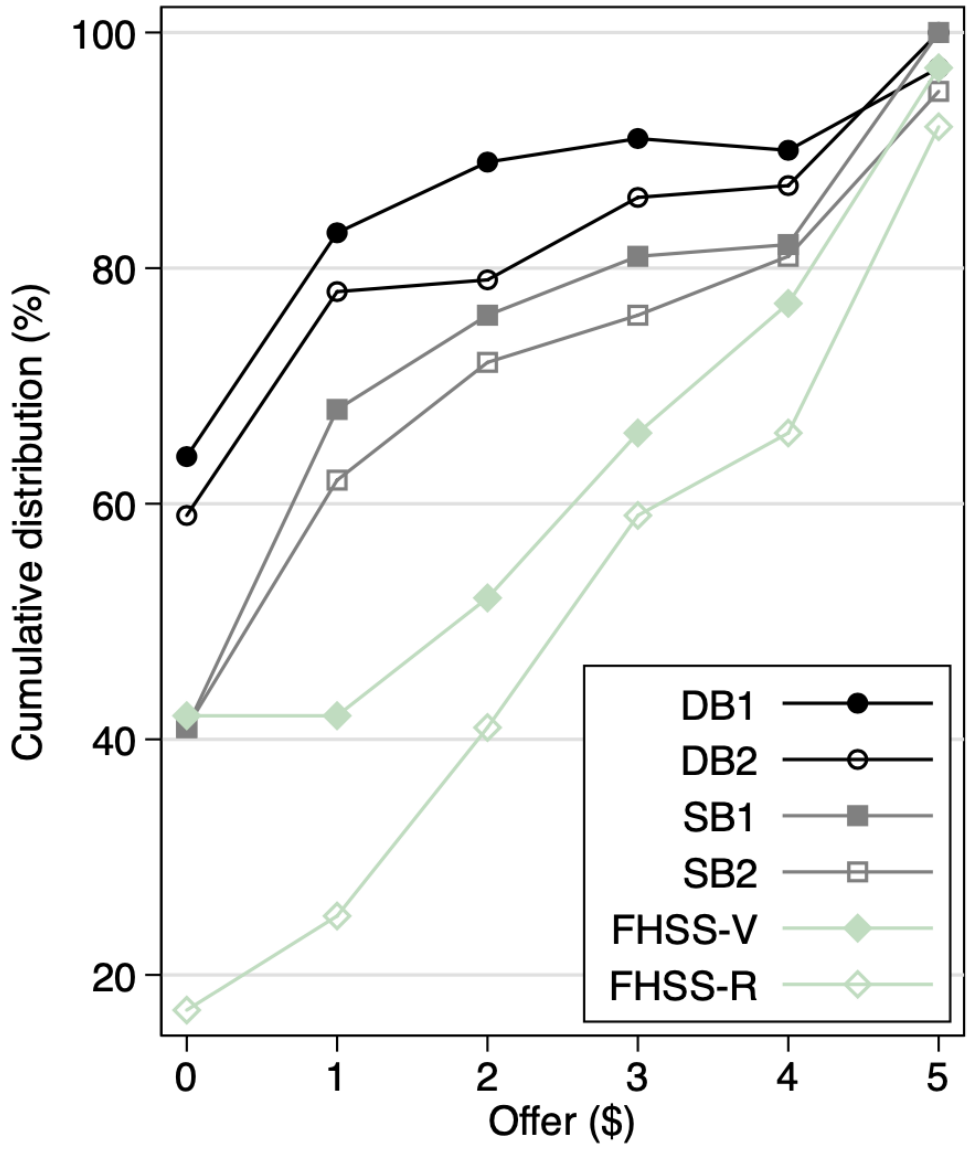
DB1 est une version dans laquelle la décision du divider est totalement inconnue du Receiver, puisque le dictateur peut avoir reçu des faux billets. La distribution des actions est inconnue.

DB2 Identique à DB1, sauf que la distribution des actions est connue

SB1 L'expérimentateur ouvre l'enveloppe du divider, brisant l'anonymat avec l'expérimentateur

SB2 Traitement identique, hormis que le divider doit remplir un formulaire pour se faire rembourser sa part

FIGURE 4.2: THE EFFECT OF SOCIAL DISTANCE ON DICTATORS' DECISION

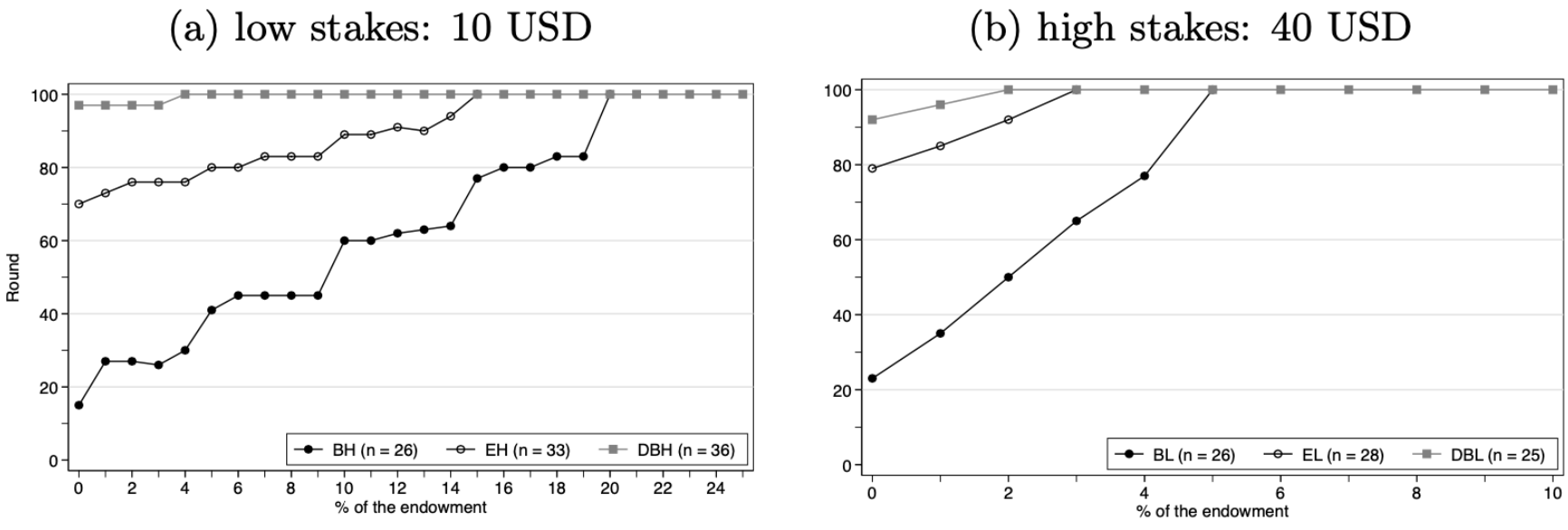


Note. Cumulative distribution of the amount donated by dictators in each treatment. *Source.* Hoffman et al. (1996, p.654), Figure 1.

Homo economicus III - Argent gagné

Les comportements du dictateurs peuvent changer, selon le montant à partager, comme le montre la figure suivante

FIGURE 4.3: OFFERS IN THE DICTATOR GAME WITH EARNED MONEY



Homo economicus III - conclusion

In summary, the selfishness hypothesis has received some very strong challenges in recent years. In general, experimental studies have documented that people do incorporate feelings for others into their behavior and hence presumably into their utility functions. The exact way this is done may be complicated, however. In the Hoffman et. al experiments described above, it appears that people are looking for excuses to be selfish, which, in this experiment, come in the form of either winning a contest and “earning” the right to keep more or being able to hide their selfishness from others.

Analyse de la rationalité individuelle, de l'égoïsme, différentes méthodologies

L'expérience du dictateur suggère une place à l'altruisme dans les préférences individuelles. Cependant, si l'on veut étendre cette analyse de la rationalité, il convient d'investiguer d'autres pistes, dans d'autres contextes.

- le comportement « altruiste » d'un individu pourrait être guidé par la norme, ce qui invite à délimiter les apports de l'analyse économique et de l'analyse sociologique
- dans le champ même de l'économie, l'origine des comportements des donateurs pourrait avoir d'autres raisons que l'altruisme, liés par exemples à des arguments d'*incitation*

La considération du phénomène des pourboires dans les transparents suivants met en évidence ces deux pistes. En préambule, on reprécise ce que l'on définit comme *homo oeconomicus* et *homo sociologicus*.

Ouverture : homo economicus et homo sociologique

One of the most persistent cleavages in the social sciences is the opposition between two lines of thought conveniently associated with Adam Smith and Emile Durkheim, between homo economicus and homo sociologicus. Of these, the former is supposed to be guided by instrumental rationality, while the behavior of the latter is dictated by social norms. The former is "pulled" by the prospect of future rewards, whereas the latter is " pushed" from behind by quasi-inertial forces (Gambetta, 1987). The former adapts to changing circumstances, always on the lookout for improvements. The latter is insensitive to circumstances, sticking to the prescribed behavior even if new and apparently better options become available. The former is easily caricatured as a self-contained, asocial atom, and the latter as the mindless plaything of social forces. In this paper I characterize this contrast more fully, and discuss attempts by economists to reduce norm-oriented action to some type of optimizing behavior. in “Social Norms and Economic Theory", Jon

Elster, The Journal of Economic Perspective, Vol. 3, No. 4 (Autumn, 1989), pp. 99-117Vol. 3, No. 4 (Autumn, 1989), pp. 99-117

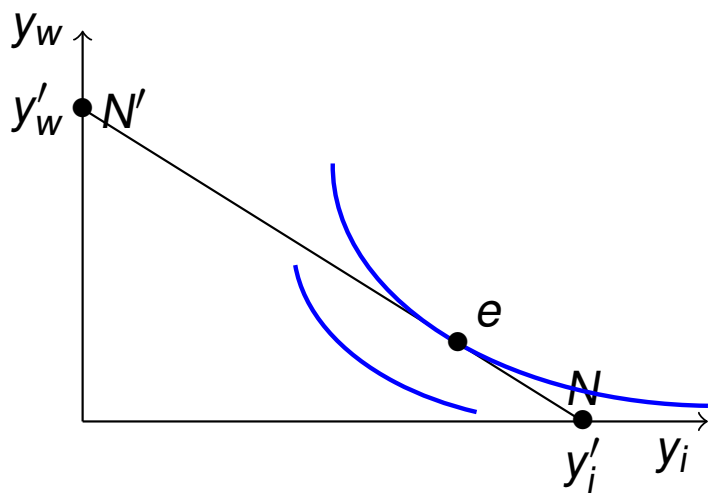
Rationalité et pourboires

You check into a hotel and a porter carries your bags to your room. How much should you tip ? A hair stylist cuts your hair. What is the appropriate tip ? A waitress serves you a meal in a restaurant. What tip should you leave ? In the analysis below, we will use indifference curves, our basic tool for analyzing consumer behavior, to find an answer to questions of this type. The answer that we come up with may seem bizarre. In fact, no universally agreed- to theory of tipping exists,and the phenomenon is a true economic anomaly. It certainly will not fit our picture of the psychological makeup of consumers because our analysis will violate the selfishness assumption that we made earlier. More precisely, we will consider leaving a tip an altruistic act ? one that reflects the tipper's concern about the utility (happiness) of the tippee.

Some people believe that tipping is motivated by fear of embarrassment. "Stiffing" (failing to tip) a server can lead to an embarrassing confrontation. However, it will be our assumption that people leave tips because they care about their servers. Assume that customer i in a restaurant cares about the utility of her waiter in the sense that her utility function depends not only on her own income but also on the waiter's income. (Our analysis here borrows heavily from the work of Robert Scott in "Avarice, Altruism, and Second Party Preference," Quarterly Journal of Economics 86, no. 1 (February 1972).)

Rationalité et pourboires - suite

Consider the following Figure. In this diagram we have placed the income y_i of the customer on the horizontal axis and the income of the server (waiter) y_w on the vertical axis and have depicted the customer's indifference pouvecurve. To determine the tip that a person will leave given his or her tastes, we devise the following "categorical imperative tipping rule" : Give the tip that, if left by all other customers, would provide the server with the income that you feel is best, considering your preferences and your income.



In the mind of our customer, this tipping rule transforms the tip she will give into an estimate of the server's income. First, the customer estimates the number of meals she expects the waiter to serve given the restaurant's reputation and price. We will call this D. If the average price of meals served is p, the income of the waiter will be $y^w = tip.percentage * D * p$. Note that given the demand for the meal and the price of the meal, the categorical imperative tipping rule transforms each tip percentage into income for the customer and income for the waiter as depicted by line NN' in the Figure.

Rationalité et pourboires - suite

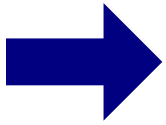
Here, we see the customer starting out with income y_i' . Line NN' shows how the incomes of the customer and the waiter are determined by the tipping rate of the customer. Clearly, if no tip is left, the waiter will receive no income and the customer will stay at income y_i', point N in Figure 3.14. If the tipping rate is set at such a high rate that the customer transfers all her income to the waiter, we will be at point N', where the customer has no income and the waiter is doing extremely well.

To choose an optimal tipping rate, then, our customer must select the point on line NN' that is best–that places her on the highest indifference curve consistent with line NN'. That occurs at point e. The tipping rate consistent with point e is, therefore, the optimal one for the customer to set.

L'utilité de donner un pourboire et qualité du service

Modèle : La note du restaurant est constante, q la qualité fournie par le serveur varie, t le pourboire, w le revenu de l'agent économique. Quelle fonction d'utilité ?

$v(w-t)$	$w-t$ est le revenu restant pour les autres consommations, dont l'utilité v est croissante concave, $v' \geq 0$, $v'' \leq 0$
$h(t-n(q))$	$n(q)$ est la norme, et $h(t-n(q))$ mesure le fait de se conformer à la norme, où, mieux, donner plus que la norme. Naturellement $n' \geq 0$, $h' \geq 0$, h" ≤ 0.
$g(t,q)$	En prenant compte les motivations psychologiques, non liées aux normes social, g might depend on service quality. Naturellement $g_t > 0$ and $g_{tt} < 0$, and clearly $g_{tq} > 0$
$d(q)$	l'utilité du dîner avec la qualité de service q, $d' \geq 0$



Démontrer que le pourboire optimal est une fonction croissante de la qualité

Comportement du client : tip croissant avec la qualité

Le client maximise le programme

$$\max_t \quad U = V(w-t) + h(t - N(q)) + g(t,q) + d(q)$$

La condition première de ce programme, $U_t = 0$, s'écrit

$$-v'(w-t) + h'(t - N(q)) + g_t(t,q) = 0;$$

Cette condition définit implicitement une fonction $t(q)$ [L'étudiant vérifiera que la condtion seconde $U_{tt} < 0$ est vérifiée, ce qui établit la définition et l'unicité de la fonction $t(q)$.]

Si on dérive maintenant l'expression $U_t = 0$ par rapport à q, on obtient, sans oublier la variation de $t(q)$ avec q (notée t') :

$$-t'\left(-v''(w-t)\right) + (t' - N'(q))h''(t - N(q)) + g_{tq}(t,q) = 0$$

ce qu'on réécrit

$$t'\left(-v''(w-t) - h''(t - N(q))\right) = \left[g_{tq} - N'(q)h''(t - N(q))\right]$$

Notez que le coefficient mutiplicatif de t' est strictement positif, car $v'' < 0$ et $h'' < 0$; Notez par ailleurs que le membre de droite de l'égalité est strictement positif ($g_{tq} > 0$, $N'(q) > 0$ et $h'' < 0$), ce qui conduit à la conclusion attendue :

$$t'(q) > 0$$

Service optimal du serveur, par anticipation du pourboire

Le serveur devrait donc en retour choisir q qui maximise $\max_q t(q) - e(q)$ où $e(q)$ est la désutilité de fournir la qualité q, $e' \geq 0$ et $e" \geq 0$.

Le choix optimal, q^* satisfait la condition de premier ordre :

$$t'(q) - e'(q) = 0$$

c'est-à-dire la relation qu'il y a entre la qualité de service et la sensibilité des pourboires au service. En particulier quand les pourboires sont plus sensibles à q (cad t' plus élevé), la valeur de e' est plus élevée, ce qui signifie un service de plus haute qualité (puisque $e" \geq 0$). Ce résultat est tellement intuitif qu'il devrait être vérifié empiriquement.

Ofer Azar rapporte dans un survey que ce n'est pas vraiment le cas : The theoretical model suggested that low sensitivity of tips to service quality should result in low service quality in equilibrium, but the empirical evidence shows that while tips are hardly affected by service quality, customers rank service quality as being very high on average. The co-existence of low sensitivity of tips to service quality and high service quality in equilibrium is what I denote "the tipping ? service puzzle." It raises the question why the theoretical predictions, which seem quite intuitive, do not hold empirically.

in Ofer Azar, "Incentives and service quality in the restaurant industry : the tipping-service puzzle", Applied Economics, 2009, 41, 15, 1917. 3.

Le pourboire, un phénomène économique ....

Tipping is a significant economic activity. Twenty-six billion dollars are paid as tips per year in the United States, and there are more than 30 jobs that are considered tip worthy. However, is tipping best explained by economic theory or is it mostly a psychological phenomenon best explained by psychologists ? Two factors suggest that economic theory alone may not be the best tool to use to explain tipping.

First, tipping is viewed as an anomalous activity by economists because tipping after the service has been provided has no impact in the quality of the service provided.

In addition, if the reason for tipping is to induce better service, one would think that better service would call forth better tips. But research shows a very weak connection between the size of tips and the quality of service. This finding is even true for customers who repeatedly patronize a restaurant because even they don't vary the tips in accordance to service and, by their own admission, the decision to tip is not affected by the future probability of visiting the restaurant.

There is a large body of evidence that suggests that the psychological view of tipping is correct. For example, tipping is less prevalent in countries where inequality between people is less culturally acceptable, suggesting that tipping is an activity diners engage in to reduce their own discomfort. Other evidence suggests that waiters who stand out of the crowd by wearing something unique increase their tips by 17%. Also, giving a positive weather forecast when presenting the bill will increase a waiter's tip by 19%. Putting a smiling face on a bill will increase a waitress's tip by 18% but will decrease a male waiter's tip by 9%. There is not much in economic theory to explain these outcomes.

... ou psychologique ?

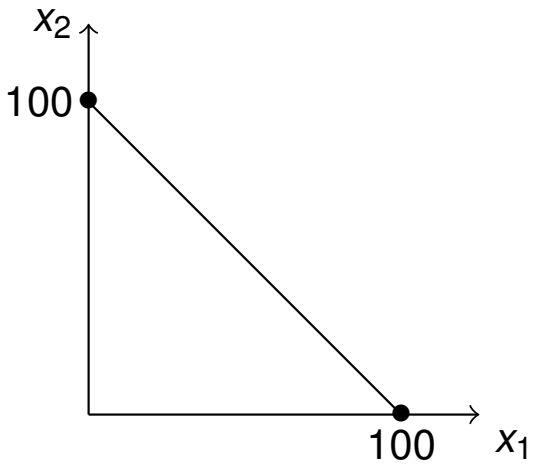
So ... is tipping an economic phenomenon used to monitor waiters or a psychological one used to make you feel good about yourself ?

Perhaps both.

Source : Adapted from “Your Pound of Flesh, Sir,” as appeared in Financial Times, April 9, 2005.

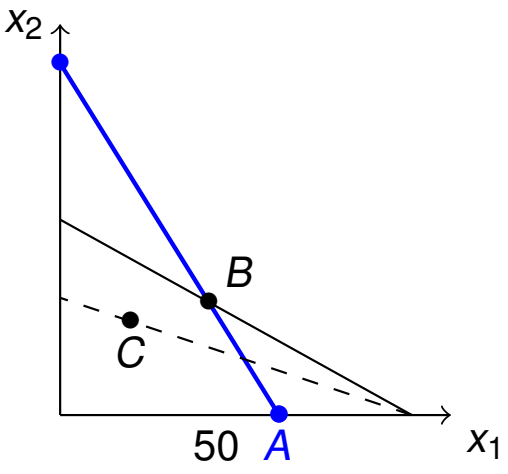
Préférences révélées

A student is brought into the room, given a certain amount of money, and asked to choose which bundle of goods he or she most prefers from those he or she can afford. Each good has a fixed price. So, for example, the student may be given \$100 and told that good 1 costs \$1 and good 2 costs \$4. He obviously can afford to buy, say, 100 units of good 1, 25 units of good 2, or any combination of goods 1 and 2 whose cost is not more than \$100. One such bundle, for example, is 40 units of good 1 and 15 units of good 2 because that would cost exactly \$100. After the student completes this task, he or she is given another one with a different amount of income and different prices and told to choose again. This is repeated eight times. To help the student in the experiment, he or she is presented with a series of what we will call budget lines and asked to choose which combination of goods along the budget line they want most. For example, take the case illustrated the following Figure.



In this case, the subject has \$100 and faces prices that are \$1 for good 1 and \$1 for good 2. (We know this because if he spends all his money on good 1, he can buy 100 units ; and the same is true for good 2, so each good must cost \$1. We will explain this more clearly in the chapters in this section.) The subject will be given these budget lines one at a time and asked to choose a bundle for each one. Look at Figure 3.2 and the dots presented there.

Préférences revélées (suite)



In this figure, we see one subject (Subject 40) and three of the budget lines he or she faced. The dots on each budget line are the choices made by this subject in each budget price situation. As we can see, this subject chose A when he faced the thick (blue) budget line, C when he faced the dashed budget line, and B when he faced the thin budget line. Do these choices look strange to you ? If so, what is strange about them ? Do you think that people who choose in this manner are likely to have well-behaved demand functions ?

Actually, the choices made by this student subject violate some ba- sic as- sumptions that economists like to impose on people when they make choices. What do you think those assumptions are ?

Préférences revélées - un exemple d'inconsistance

Let us start with a simple concept. Say we observe a consumer in two situations described by how much income he has and what prices he faces.

For example, say that in situation 1, he has $100 and can buy apples and pears each at $1 a piece. In that situation, say he buys 50 apples and 50 pears, which constitute bundle x (50 apples, 50 pears). (Note that the consumer can exactly afford this bundle because it exactly exhausts his income.)

Now say that the consumer faces another situation in which he has $200 to spend but the price of apples has risen to $4 while the price of pears has stayed at $1 each. Say the consumer now buys 35 apples and 60 pears, bundle y (35 apples, 60 pears), the cost of which is exactly $200.

Such a consumer, we will claim, acted in a strange manner because notice that after the prices changed, he chose bundle $y = (35 apples, 60 pears)$, which he could have afforded in the first situation but chose not to take. If he did not like that bundle in the first situation (and chose $x = (50 apples, 50 pears)$, then why the sudden reversal ? The problem is that by choosing x over y in the first situation when both were affordable (at prices of $1 each), he revealed a direct preference for x over y ; but in the new situation when his income and the prices changed, he revealed a preference for the opposite bundle. We would like to rule such reversals out. This

Préférences revélées - les choix consistants
WARP et SARP

Définition : On dit qu'un panier x est révélé (directement) être préféré au panier y lorsqu'il existe une contrainte de budget pour laquelle x et y sont faisables, telle que x est choisi.

Weak Axiom of Revealed Preference (WARP) : Si le panier x est directement révélé être préféré à y, quand $y \neq x$, alors y n'est jamais directement révélé être préféré à x.

Strong Axiom of Revealed Preference (SARP) : Si le panier x est révélé être préféré à y (soit directement, soit indirectement), quand $y \neq x$, alors y n'est jamais directement révélé (ou indirectement) être préféré à x.

la différence entre ces deux définitions est que la seconde permet de considérer entre deux paniers x et y plusieurs séquences de révélation directe, où l'on applique ensuite la transitivité des préférences (par exemple $x \succeq a \succeq b \succeq y$)

Choix inconsistants une première analyse

Now that we have learned about revealed preferences and the concepts of transitivity of preferences, etc., it should be clear why the subject we discussed in our teaser, Subject 40, was not making choices according to the assumptions of economic theory. In fact, he or she violated WARP, SARP, and GARP.

To see this, note that when Subject 40 chose allocation A, he or she was choosing from the thick budget line ; C was chosen when the budget line was dashed ; and B was chosen when the budget line was thin. This means that A was chosen when C was af- fordable, but then C was chosen when A was affordable, violating WARP. In addition, notice that C is indirectly revealed to be preferred to B (because C is directly revealed to be preferred to A, but A is directly preferred to B), but B is directly revealed to be pre- ferred to C, which violates SARP and GARP. With these violations, we cannot expect this person to make the kind of transitive choices we need for economic theory.

In fact, we will rule such choices out in what we do in this text, yet we realize that they may exist out there in the real world for some (irrational ?) people. But let us be more precise about the actual experiment Andreoni and Miller performed.

La théorie des préférences révélées pour tester un altruisme rationnel

Subjects in economic laboratory experiments have clearly expressed an interest in behaving unselfishly. They cooperate in prisoners' dilemma games, they give to public goods, and they leave money on the table when bargaining. While some are tempted to call this behavior irrational, economists should ask if this unselfish and altruistic behavior is indeed self-interested. That is, can subjects' concerns for altruism or fairness be expressed in the economists' language of a well-behaved preference ordering ? If so, then behavior is consistent and meets our definition of rationality.

An experiment run by James Andreoni and John Miller, "Giving According to GARP : An Experimental Test of the Consistency of Preferences for Altruism" in d'une expérience test people's preferences for altruism. To make this more concrete, say that you are given $100 and asked to split it be- tween yourself and some stranger drawn at random. Say that every dollar you give up can be transferred one for one to the other person. So if you transfer $10 to him or her, he or she gains $10 and you lose $10. The cost of being altruistic here is 1. Now say that you have to give up $40 to transfer $10 to the other person. In this case, the cost of altruism has obviously gone up from 1 to 4.

Altruisme rationnel (II) : l'expérience

Les choix fait par la personne s ont des conséquences pour elles, π_s, et pour d'autres personnes, π_0 ; L'utilité de la personne s est :

$$U_s = u_s(\pi_s, \pi_0)$$

L'expérience va tester des préférences quasi-concaves dans l'espace π_s, π_0. L'expérience est similaire à celle du dictateur, hormis la contrainte budgétaire suivante :

$$\pi_s + p\pi_0 \leq m$$

où m désigne le montant à partager, et p le prix du don.

Le framing de l'experience : Each of the decision problems differed in the number of tokens to be divided and the number of points a token was worth to each subject. Tokens were worth either 1, 2, 3, or 4 points each. The total number of tokens available was either 40, 60, 75, 80, or 100. Subjects made their decision by filling in the blanks in a statement like, "Divide 60 tokens : Hold _____ at 1 point each, and Pass _____ at 2 points each."

Altruisme rationnel (III) : l'expérience

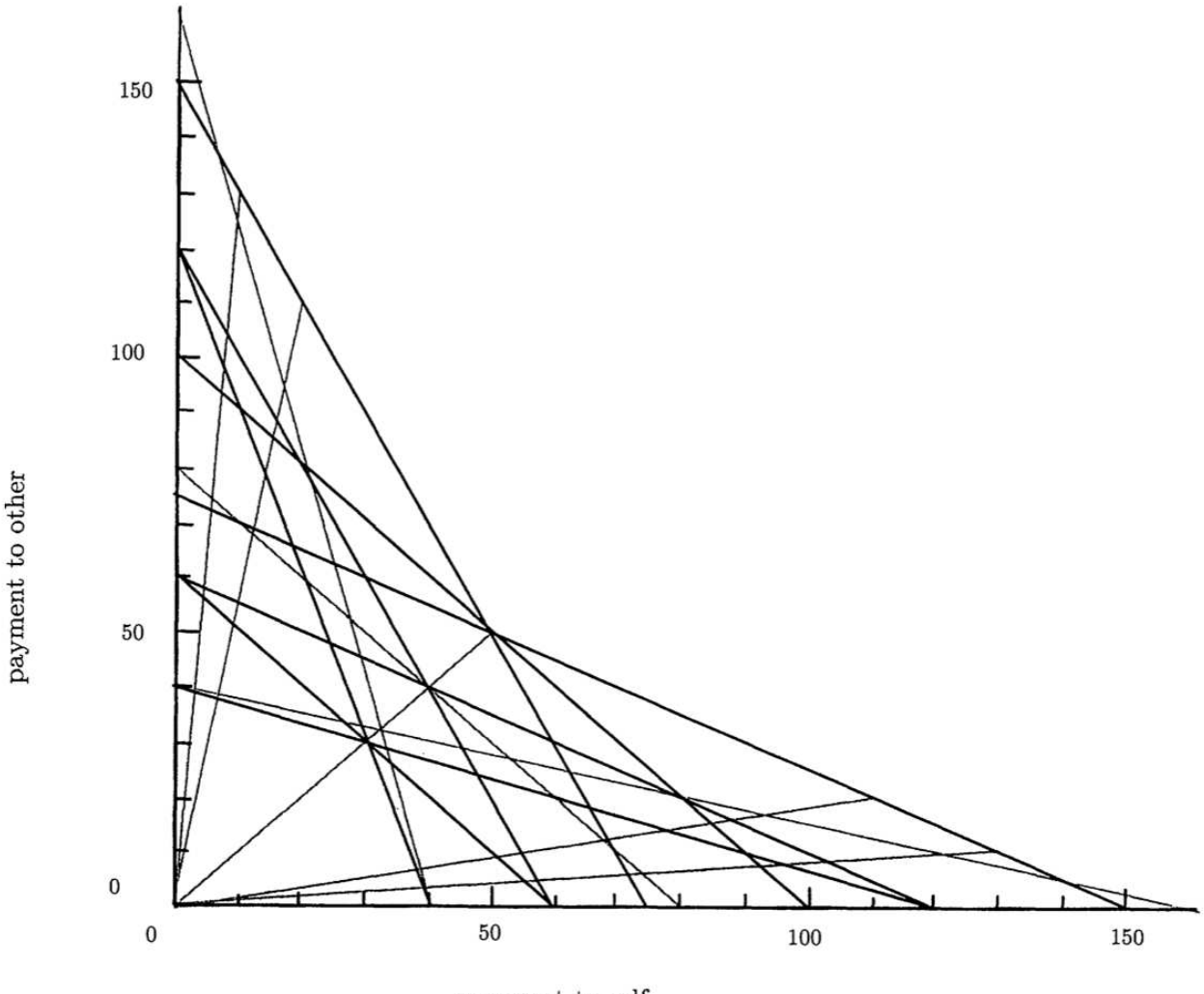
TABLE I

ALLOCATION CHOICES

Budget	Token Endowment	Hold Value	Pass Value	Relative Price of Giving	Average Tokens Passed
1	40	3	1	3	8.0
2	40	1	3	0.33	12.8
3	60	2	1	2	12.7
4	60	1	2	0.5	19.4
5	75	2	1	2	15.5
6	75	1	2	0.5	22.7
7	60	1	1	1	14.6
8	100	1	1	1	23.0
9[a]	80	1	1	1	13.5
10[a]	40	4	1	4	3.4
11[a]	40	1	4	0.25	14.8

[a] Were only used in session 5, others used in all sessions.

Altruisme rationnel (IV) : l'expérience



Altruisme & Violation des préférences révélées

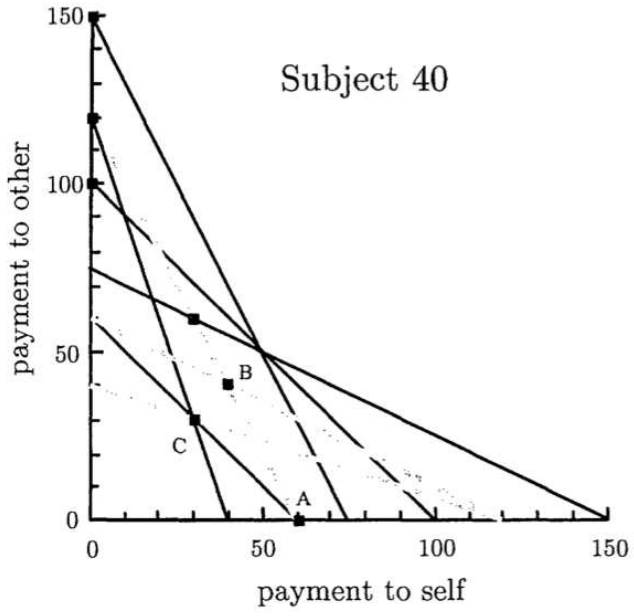
TABLE II

VIOLATIONS OF REVEALED PREFERENCE

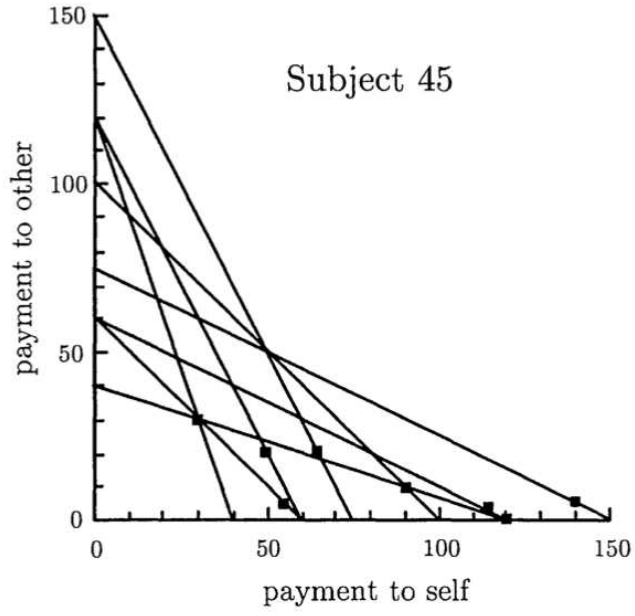
	Subject	Number of Violations			Critical Cost Effic. Index
		WARP	SARP	GARP	
Sessions 1–4:	3	1	3	2	1*
	38	2	7	7	0.92
	40	3	8	7	0.83
	41	1	1	1	1*
	47	1	1	1	1*
	61	1	4	3	0.91
	72	1	1	1	1*
	87	1	1	1	1*
	90	1	1	1	0.98
	104	1	2	1	1*
	126	1	3	1	1*
	137	1	1	1	1*
	139	1	1	1	1*
Session 5:	211	1	2	2	1*
	218	1	2	1	1*
	221	1	1	1	1*
	223	1	1	1	1*
	234	1	1	1	1*

*Indicates that an ε-change in choices eliminates all GARP violations.

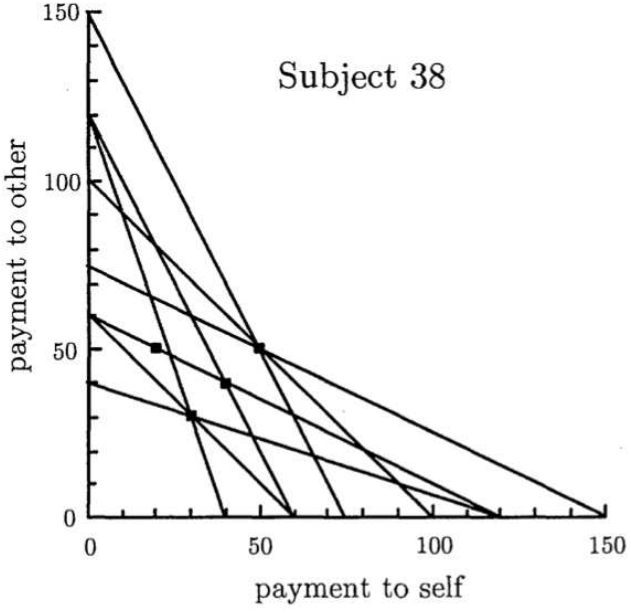
if agents had violations of the revealed preference axioms, how severe were they ? One measure of the severity is Afriat's (1972) Critical Cost Efficiency Index (CCEI). Roughly speaking, the CCEI gives the amount we would have to relax each budget constraint in order to avoid violations

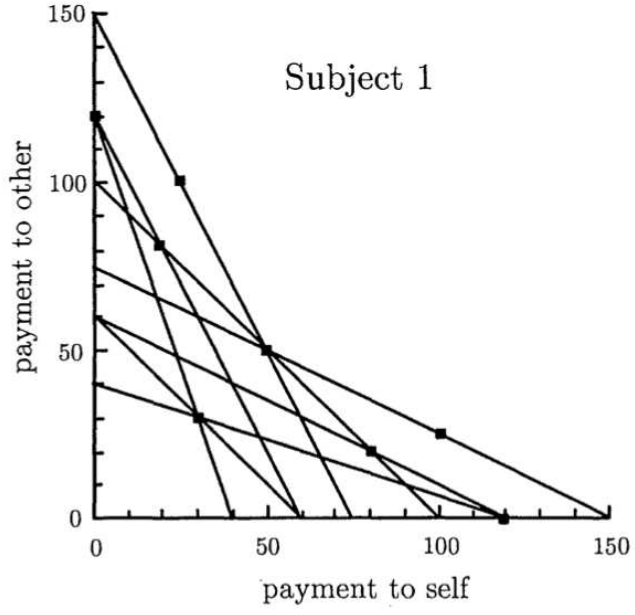


a. Violations of GARP



b. Weak Selfish





Altruisme rationnel (II)

In the Andreoni-Miller experiment, the researchers give subjects a number of different amounts of money and vary the cost of altruism. They are interested in how many people exhibit rationality in the sense that they do not violate the axioms of WARP, SARP, and GARP. They find that over 10% of subjects do violate the axioms. If we now take the ones who do not violate them, we can use the data generated by their choices to estimate their actual utility functions. Remember that a utility function tells a story about a person's preferences. In this case, if you showed me your utility function, I could tell you what your attitude is toward altruism and toward the person you were allocating money to.

Évaluer l'altruisme (suite)

For example, say that you considered the person who receives money from you to be a perfect substitute for yourself - your clone, in fact, whom you care for just as much as you care for yourself. In other words, for any given dollar, you do not care if you keep it or give it away to that person (your indifference curves are straight lines with slope 1). In such a case, given the price of altruism, you would give all the money to the person and would get the biggest utility from it. For example, say that the price of altruism is 1/4, meaning that for every dollar you give up, your counterpart gets $4. In such a case, if you gave your cohort all the money, he or she would receive $400, while if you kept it, you would have $100. Because you think your cohort is just as worthy as yourself, obviously it would be best to give away all the money. In fact, 6.2% of subjects did this. Now assume that you are perfectly selfish and don't care at all about your cohort. Then, obviously, for any price of altruism, you would keep all the money, and 22.7% of the subjects did that. Finally, let us say that you get utility from a dollar only if your cohort gets exactly the same amount of money. You are an egalitarian and get utility only to the extent that you consume dollars in the ratio of 1 :1 with your cohort. In that case, you would split the $100 in such a way as to equalize the amounts going to you and your cohort, and 14.2% of subjects had these preferences.

Age et rationalité

The experiments described above were run on college-age subjects. By and large, they demonstrate that people who reach that age make consistent choices. But how do we get to the point where our choices are consistent ? Are we born with that ability, or do we learn it as we grow ? This question has been investigated by William Harbaugh, Kate Krause, and Timothy Berry, “GARP for Kids : On the Development of Rational Choice Behavior,” American Economic Review, 2001, 91(5) : 1539-45.

They compared 7-year-olds with 11- and 21-year-olds. What do you think they found ? Also, does market experience improve one’s ability to make consistent choices ? If so, then we might expect in the real world that choices would be consistent because people tend to have a lot of experience with markets as they interact in the economy. See what John List and Daniel Millimet have to say about this.“ ?Bounding the Impact of Market Experience and Rationality : Evidence from a Field Experiment with Imperfect Compliance, ? Mimeo, 2005. ?Bounding the Impact of Market Experience and Ra-

GARP pour enfants

La dernière expérience suggère une question sur l'age, that is answered in another interesting experi- mental paper written by William Harbaugh, Kate Krause, and Timothy Berry* titled "GARP for Kids : On the Development of Rational Choice Behavior. ?" The questions are, do we get more rational as we get older and is there a time before which we tend to vio- late GARP but after which we do not ?

In this paper, they describe an experiment similar to that done by Andreoni and Miller with two differences. One is that they used 31 second graders, 42 sixth graders, and 55 college undergraduates, with average ages of 7, 11, and 21 years, respectively, instead of only college undergrads. Second, they offered them boxes of juice and bags of chips as goods instead of money.

They found that the average violation of GARP is different for the three age groups, but it is more pronounced when we move from second graders to sixth graders than when we move from sixth graders to college undergraduates. For example, the average number of violations per subject, out of 11 choices per subject, was 4.3 for second grad- ers, 2.1 for sixth graders, and 2.0 for college undergraduates. While these seem high, if the subjects had simply chosen randomly, we would have observed around 8.5 viola- tions. So while these subjects violated GARP, they did not choose randomly.

Experience avec des rats de laboratoire

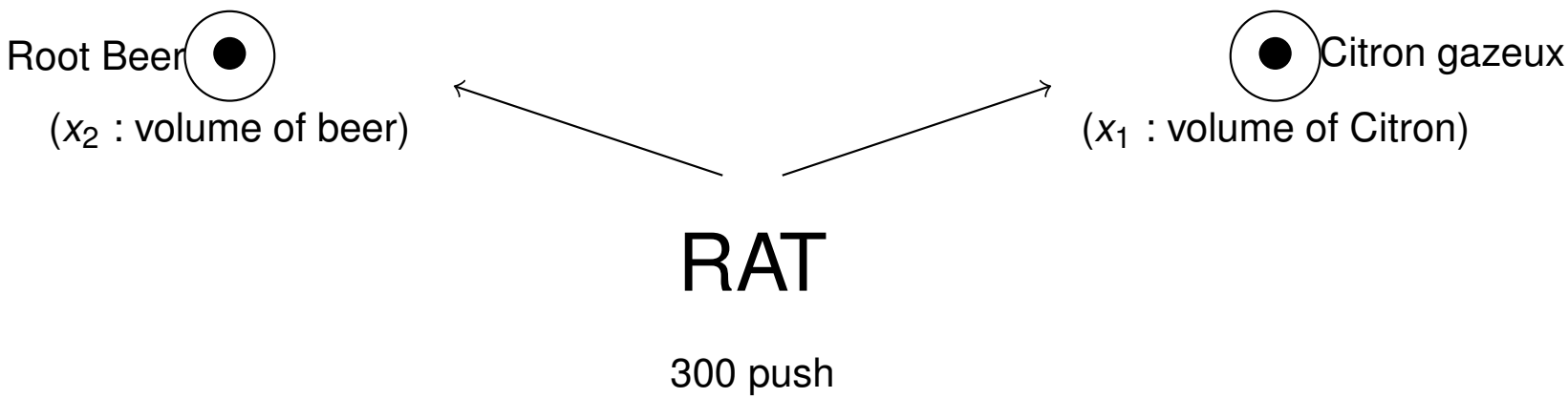
Dans l'article "Experimental Studies of Consumer Demand Behavior Using Laboratory Animals,"[1] John Kagel, Howard Rachlin, Leonard Green, Ray Battalio, Robert Baseman, and W. R. Klemm, analysent les préférences révélées de rats de laboratoire, et se rendent compte que leur comportement est compatible avec la théorie du consommateur !

The theory of the consumer, as we have described it, may look so complicated that it could not be a good description of the way people behave. For example, it implies that people can maximize their utility even when the situations they face are very complex. If we as humans are not capable of such complicated behavior, then the theory should certainly fail. But what if we could show that even lower animals like rats and pigeons are capable of behaving as if they were following the prescriptions of demand theory ? If this were true, then certainly one could not argue that the theory is too complicated for humans.

1. publié dans Economic Inquiry 13 (March 1975) : 1, pp. 22-38.

l'Experience avec les rats

Consider the following experiment. John Kagel, Howard Rachlin, Leonard Green, Ray Battalio, Robert Baseman, and W. R. Klemm* took a rat and placed it in an experi- mental chamber with two identical levers symmetrically placed on one side of the cage. When either of the levers was pushed, a nozzle above the lever would dispense a certain amount of a liquid. For exposition, let ?s say that the left lever dispensed root beer and the right dispensed Tom Collins mix. (Rats like both of these more than water in the sense that if you give them two bowls, one with water and the other with either one of these drinks, they will drink the root beer or the Tom Collins mix first.) Within a given time period, the rat was allocated a total number of pushes (for exam- ple, 300) on both levers. As long as the rat had more lever pushes available, a white light was lit on the top of each lever telling the rat that more pushes were available. When the number of pushes had been exhausted, the light would go out. (It turns out that 300 pushes were not enough to satiate the rats ; in the experiments they always exhausted the 300 pushes before the time period ended.) When a lever was pushed, an amount of liquid was dispensed into a cup below the lever and remained there for five seconds, more than enough time to consume it. The amount of root beer or Tom Collins mix dispensed with one push of the lever was controlled by the experimenter.



experience avec des rats de laboratoire - une approche théorique

Now how does this experiment relate to the theory of consumption ? If the rat was a consumer, what would his income be and what prices would he face ? Do you think that the rat will violate WARP (the Weak Axiom of Revealed Preference discussed in Chapter 3) ? Will the rat have a downward sloping demand curve ?

Now how does the experiment listed in the teaser relate to the theory of consumption we have just studied ? In our theory, the consumer allocates his fixed income to the pur- chase of two goods whose prices are fixed in the market. So in this experiment, what con- stitutes an income and what constitutes prices ? After some thought, you should come to the realization that in this rat world, a rat ?s income is the number of pushes it has on the lever (in this case, 300), and the prices are the amount of root beer or Tom Collins mix dispensed per push. For example, if one push on either lever dispenses 0.1 ml of either liquid, we can say that the prices of root beer and Tom Collins mix are the same. (en normalisant :)

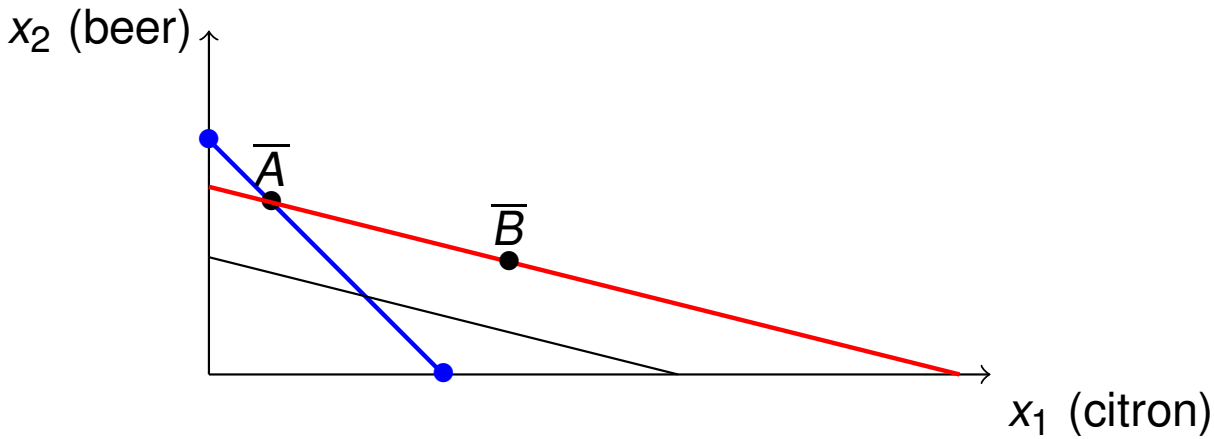
$$x_1 + x_2 = 300$$

When the amount of Tom Collins mix per push increases to 0.5 ml, then the Tom Collins mix decreases in price. In other words, the scarce commodity here is pushes on levers, and the price of a liquid is the inverse of the amount of that liquid you get for a given push.

$$x_1 + \frac{1}{5}x_2 = 300$$

experience avec des rats de laboratoire- 1er/2E set d'experience

The first experiment performed was one where each rat had 300 lever pushes, and each lever push dispensed 0.05 ml of either liquid. In other words, the prices were equal. The situation facing a rat is depicted in left Figure :



As we see in this figure, at the beginning of the experiment, the rat could choose any bundle of root beer or Tom Collins mix on or below the blue line. If we look at the actual purchases of a real experimental rat subject (call him Willard), we see that when facing these prices, Willard chose bundle $\overline{A}$.

What Kagel and his associates did next was to change the prices faced by Willard by increasing the mount of Tom Collins mix dispensed per lever push from 0.05 ml to 0.1 ml and by reducing the amount of root beer to 0.025 ml. In this way, they dramatically changed the prices facing the rat, making Tom Collins mix cheaper and root beer more expensive. However, after making these changes, they increased the number of lever pushes available to Willard by an amount that, after the price change, allowed Willard exactly enough lever pushes to buy bundle A , if he still desired. The new budget line is the red line

experience avec des rats de laboratoire - robustesse

After Willard got used to the new budget and price situation, the experimenter changed the prices once again back to their original relationship, and Willard chose point A1 ?4, meaning that when the prices and incomes returned to the original relation- ship, Willard practically returned to his original consumption (give or take a few millili- ters either way). This is a check for the consistency of Willard ?s behavior. (Note that Willard does not satisfy the Weak Axiom of Revealed Preference because he revealed himself to directly prefer A to A1 ?4 in the first situation when they were both available but then reversing himself in the second situation and choosing A1 ?4 again when they were both affordable. Still, the violation was rather small because both bundles are close to each other.

Loisir et performance

Cab drivers have good and bad days. Let's say you are a taxi driver and have rented your cab from a fleet owner for 8 hours (9 A.M. to 5 P.M.). You are having a great day, so by 1 P.M. you have already made as much as you typically make for the whole day. Do you quit and say, "- Great ! Now I can relax for the rest of the day," or do you stay on and really make a killing ?

What does economic theory say you might do ? What do cab drivers actually do when they are surveyed ? These questions will be answered later when we report the results of the survey done by Colin Camerer, Linda Babcock, George Loewenstein, and Richard Thaler.*

Colin Camerer, Linda Babcock, George Loewenstein, and Richard Thaler, "Labor Supply of New York City Cab Drivers : One Day at a Time,' Quarterly Journal of Economics 112 (May 1997) : No. 2, pp. 408 ?41.

Loisir et performance

The question is relative to the trade-off that workers face when they decide to supply their labor to the market. In that application, the trade-off existed between labor and leisure at one point in time. In real life, however, workers face a different trade-off ?how to trade off income earned and leisure today versus income earned and leisure tomorrow or next week or even next year. This is an intertemporal trade-off, and depending on how people view it, it can lead to drastically different results in their behavior. To illustrate this point, let's look at an intriguing real-world experiment on the labor supply decision of New York City cab drivers performed by Colin Camerer, Linda Babcock, George Lowenstein, and Richard Thaler. In this experiment, Camerer and his colleagues looked at how much labor New York City cab drivers supplied on the different days that they drove by looking at the time sheets they filled out as their days progressed. These time sheets allow an investigator to derive how much revenue drivers received during the day and how long they worked. Let us assume that all cab drivers try to maximize their utility, which depends on how much income and leisure they have. We then must determine over what time horizon they maximize their utility. For example, say that when cab drivers are working, there are some good days and some bad days. That is, there are some days when many people want a taxi and fares are good (perhaps when it rains or a convention is in town), and there are days when there are few fares. Let us further assume that good days and bad days are not correlated, so if Tuesday is a good day, it implies nothing about whether Wednesday will be good as well. According to economic theory, if cab drivers even have as short a planning horizon as two days (that is, if they care about their consumption and leisure over two days instead of just one), then if the first day is a good day, they will work longer on that day and take their leisure on the second day.

Loisir et performance

...then if the first day is a good day, they will work longer on that day and take their leisure on the second day.

The reason is simple. If the implicit wage of driving a cab is high (if the cab drivers are having a good day), then they will work harder that day because the cost of leisure is very high on a good day. The cab drivers will then plan to take more leisure on the second day, which is expected to be a “normal” day with the average implicit wage. The cost of leisure is high on day 1 and low on day 2 ; hence, it makes sense to work when the wage is high and shirk when the wage is low.

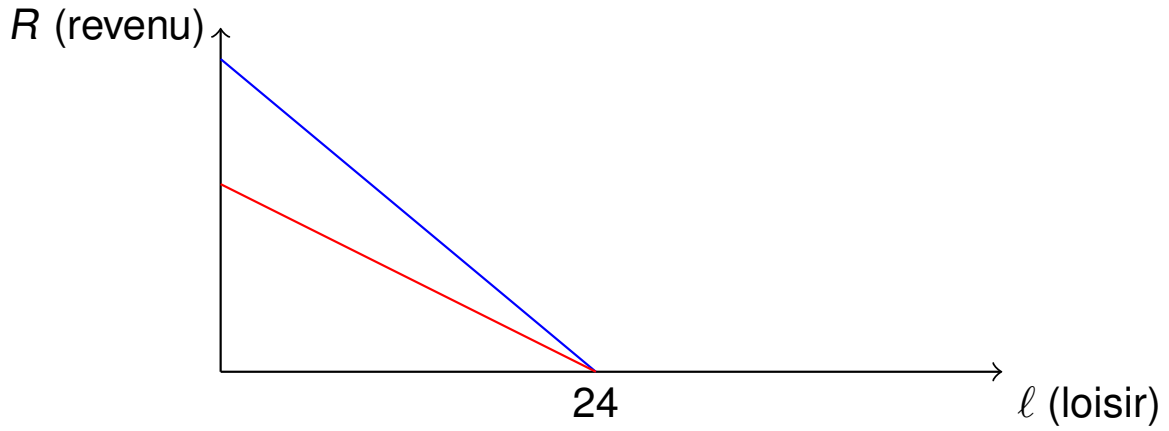
Camerer and his colleagues found just the opposite ! Upon checking the time sheets of drivers, they noticed that when the implicit wage was high and cab drivers were having a good day, they tended to leave work early and enjoy leisure. In fact, the labor supply elas- ticities (i.e., the percentage change in the hours worked for a given percentage change in the wage) response was negative and ranged from 0.503% to 0.269% for the three data sets they reviewed. This means that increasing the implicit wage on a given day by 1 per- cent led to a decrease in the amount of labor supplied of between 0.503% and 0.269%. The explanation offered by Camerer is quite straightforward and intuitive. It appears that cab drivers have a day-by-day time horizon. When they come to work on a given day, they seem to have a target income for which they are aiming. If they reach that tar- get early in the day because they have done well, instead of continuing to work (which is what they should do if they were looking ahead), they quit and take their leisure on that day. This simple income target is justifiable on several grounds. Most immediately, however, it is a simple rule to administer ?much more simple than the complicated intertemporal maximization rule implied by economic theory. Its major de- fect is that its myopia may lead to regret in the future when a day is slow but drivers have to keep driving to make their target incomes.

Loisir et performance

Reprenons les aspects de ce problème. Le chauffeur de taxi maximise $U(\ell, x)$, où ℓ le temps non travaillé et x les biens que le chauffeur peut acheter avec le revenu R issu de son travail ; avec un niveau de prix p, on définit x par la relation $R = px$. On peut par ailleurs écrire ce revenu directement comme le produit du temps de travail t et du revenu horaire w, ($R = wt$), ce revenu horaire w étant une variable qui dépend du contexte, Bon jour ou mauvais jour. La contrainte budgétaire dans ce cas est $t + \ell = 24$ soit encore

$$\ell + \frac{p}{w} x = 24.$$

La figure suivante permet d'illustrer ce cas : a) plus w est élevé, plus la CB est favorable (dans notre exemple $R_b > R_r$ quand $w_b > w_r$) : w est la pente de cette CB. b) Il n'est pas immédiat pour des préférences prises au hasard que R soit constant. Or c'est ce qu'on observe dans l'expérience. $\Rightarrow$ Myopie.



Loisir et performance : que prédire (horizon 1 jour)

On peut déjà chercher, si l'horizon suivant lequel le chauffeur de taxi cale ses choix est quotidien, son choix de travail optimal.

Dans le cas de préférences Cobb-Douglas, par exemple $U(\ell, x) = \ell x$, le programme du chauffeur de taxi, s'il maximisait son temps de travail dans une journée serait

$$\begin{array}{lll} \max_{\ell,x} & & U(\ell, x) = \ell^2 x \\ & s.c. & \ell + \dfrac{p}{w} x = 24 \end{array} \tag{1}$$

soit par une substitution de x, soit par les méthodes standard de résolution, on trouve que le comportement optimal est tel que

$$\ell = 8 \qquad x = 8\frac{w}{p}$$

CAD la durée de travail ne dépend pas de w. Le chauffeur ne change rien à ses habitudes, quel que soit le contexte (de marché) représenté par w.
Seul le revenu du travail sera variable en fonction de w

Loisir et performance : que prédire (horizon 1 jour)

L'exemple précédent n'est pas général. Dans la figure suivante, on montre comment à la fois consommation et revenu pourraient augmenter suite à un contexte plus favorable. 1

En tout état de cause, on voit bien que les préférences qui consistent à conserver le même revenu quel que soit w ne peuvent être que très particulières. MAIS, elles existent.

Loisir et performance : que prédire (horizon 2 jour)

On peut se demander alors si sur un horizon de plusieurs jours, (par exemple deux jours), il ne serait pas toujours optimal de profiter d'une aubaine d'un bon jour pour travailler plus afin de prendre plus de loisir un mauvais jour.

Dans un contexte par exemple, où il y aurait 50% de bons jours (W_G) et 50% de mauvais jours (W_B) on compare les trois stratégies suivantes

Stratégie α Travailler le même nombre d'heures ℓ^* pendant les bons jours et les mauvais jours, ce qui permet de rapporter le revenu moyen $R^* = \ell^* \dfrac{W_B + W_G}{2}$

Stratégie β Travailler ℓ_G les bons jours et ℓ_B les mauvais jours, de façon à rapporter le même revenu moyen R^*

Stratégie γ Travailler un nombre d'heure différent chaque jour de façon à avoir le même revenu chaque jour, à savoir R^*.

Classer ces trois stratégies en fonction du nombre d'heure moyen travaillé

On trouve $\tilde{\ell}_\alpha = l^*$, $\tilde{\ell}_\beta = \ell^* \left(\frac{1}{2} + \frac{1}{2} \frac{W_B}{W_G} \right)$, $\tilde{\ell}_\gamma = \ell^* \left(\frac{1}{2} + \frac{1}{4} \left[\left(\frac{W_B}{W_G} \right)^2 + \left(\frac{W_B}{W_G} \right)^2 \right] \right)$.

Que testent Camerer et alii

la myopie

Les chauffeurs ont un objectif de revenu par jour, une fois cet objectif atteint, ils quittent le travail

- point de vue de l'organisation ce ne semble pas optimal, s'il y a une hétérogénéité dans la demande, d'un jour à l'autre.

- par ailleurs, les chauffeurs prennent plus de loisir, au moment où ce loisir est cher.

3. (Ré)examen de la coordination

1. le dilemme du prisonnier
2. le centipede
3. transfert d'information

dilemme du Prisonnier

Ci-dessous un jeu ayant une structure analogue au célèbre dilemme du prisonnier.

	Left	Right
Top	5,5	-10,10
Bottome	10,-10	-5,-5

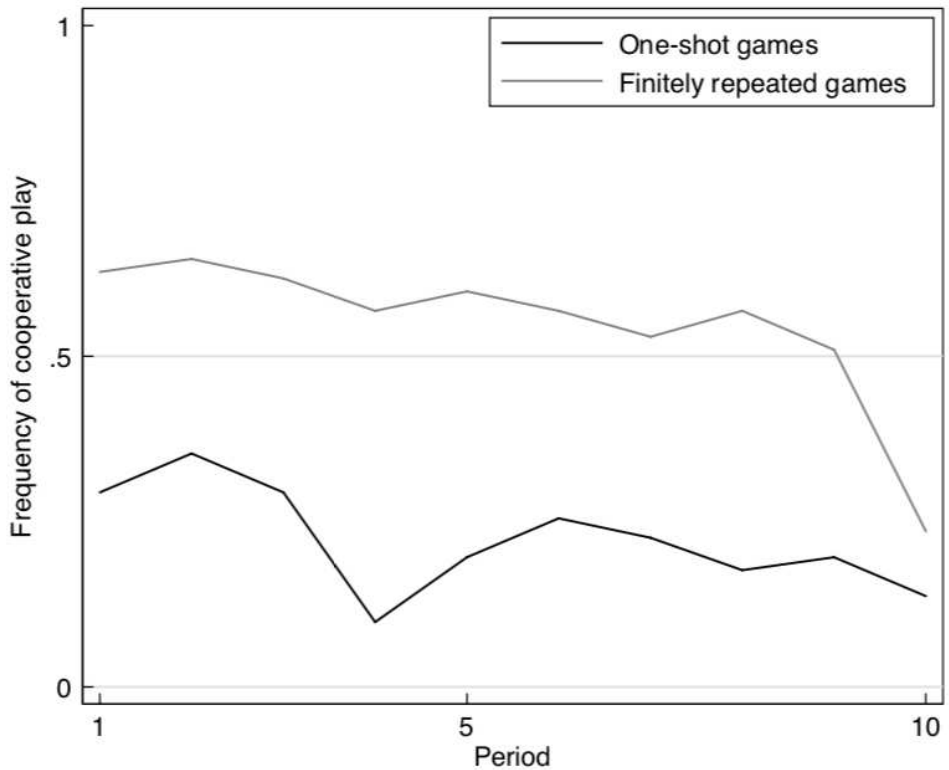
1. L'histoire de deux criminels d'un gang
2. ou de l'impossible collusion entre deux entreprises,
3. ou du protocole de Kyoto

- ; décrire l'équilibre
- ; quelle est la nature de l'équilibre
- ; décrire l'allocation efficace

Expérience sur le dilemme du prisonnier

Par Cooper et al. (1996), jeu joué dix périodes, observation des comportements choisis effectivement par les prospects. Deux régimes du jeu : Régime (H), Les joueurs savent qu'ils jouent avec le même joueur ; Régime (L), jeu one-shot répété

FIGURE 1.6: EMPIRICAL BEHAVIOUR IN PRISONERS' DILEMMA GAMES



Note. The figure reports the share of participants who decide to cooperate in each of the ten periods of the game. *Source.* Cooper et al. (1996, p.199), Figure 1.

1ères analyses sur l'expérience sur le dilemme du prisonnier

La théorie des jeux se propose d'analyser la coordination entre les choix de plusieurs agents économiques, Quand ces agents ne peuvent pas contrôler les actions qui seront entreprises par les autres agents :

1. La théorie des jeux explique difficilement le comportement humain
2. Mais... du point de vue théorique, ce jeu contient peu de coordination, car l'unique équilibre est en stratégies dominantes.
3. Quand l'équilibre de Nash n'émerge pas, on doit l'expliquer par une recherche de coopération entre les agents (coopération $\not\equiv$ coordination)
4. Encore vague, mais plus précis : la théorie des jeux explique difficilement les comportements, *quand* elle ne fait pas référence à des facteurs décrivant l'environnement social des agents.

Expérience sur le dilemme du prisonnier

Both curves show a departure from theoretical predictions.

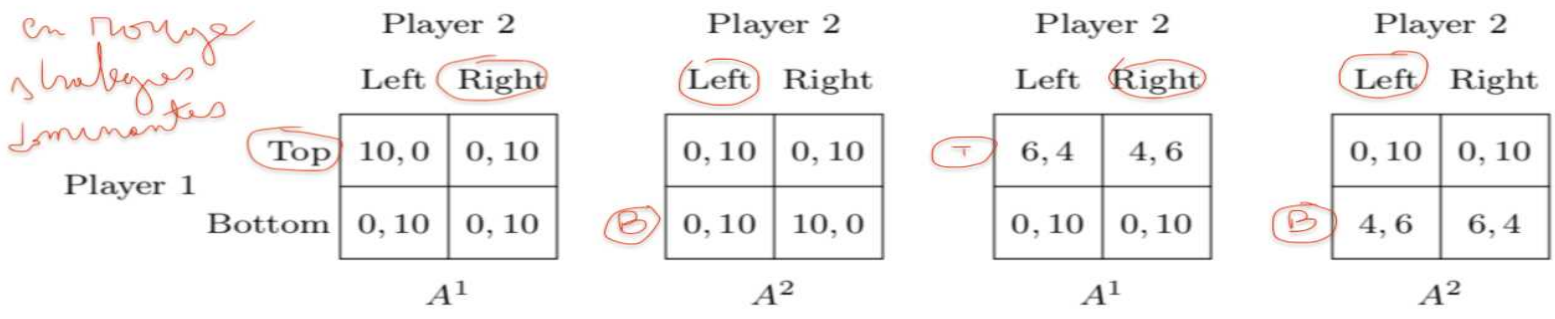
1) **Theory pre-dicts a zero% rate of cooperation in the game**. It is far from the observed patterns not only in the repeated games—which do not, in the strict sense, implements the model—but also in the one shot games. For example, in the first period, about 60% of the subjects decided to cooperate in the case of finitely repeated games, but around 35% of the people did so in one-shot games.

2) **At the same time, it is not true that these results fits with a view of human behaviour only driven by the well being of everybody and disregarding self-interest**. Free-riding behaviour, based on the temptation to increase one's payoffs at the expense of the other players, accurately describes the results in 70-50% of observed outcomes. Because these two kinds of behaviour (cooperation and deviation) are widespread, both should be accounted for by any accurate theoretical representation. As a result, neither the Nash equilibrium, nor alternative motives leading to full cooperation, are enough to account alone for the observed behaviour in the prisoners' dilemma game.

Zero-Sum Repeated Game with Incomplete Information

Considérez les deux jeux suivants, (a) et (b), qui ont une struture très similaire, et qui vont être joués plusieurs fois.

FIGURE 1.9: PAYOFF MATRICES OF TWO ZERO-SUM GAMES



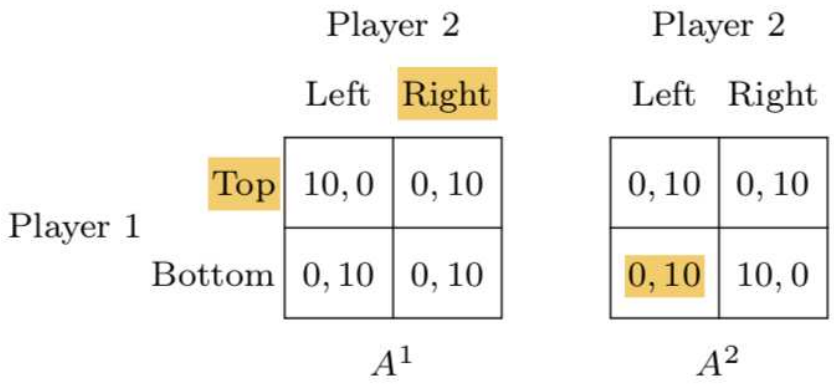
(a) Non-revealing (NR) game

(b) Fully-revealing (FR) game

Information symétrique : Les joueurs ne connaissent pas l'état de la nature A^1 ou A^2, cad une modification radicale des paiments et des stratégies à l'équilibre.

Information incomplete : L'état de la nature A^1 ou A^2 est seulement révélé au player 1. *Cette dissymétrie joue un rôle quand le jeu est joué plusieurs fois, et que l'état de la nature est fixé dès la première période.*

Expérience : Jouer le NR game



(a) Non-revealing (NR) game

Notez que chaque joueur a une stratégie dominante, mais qui est différente selon que l'état de la nature est A^1 ou que l'état de la nature est A^2.

Dans les deux états de la nature, le joueur 1 obtiendrait un payoff de 0, si l'autre joueur connaissait l'état de la nature.

Expérience : le NR game

		Player 2	
		Left	Right
Player 1	Top	10, 0	0, 10
	Bottom	0, 10	0, 10

A^1

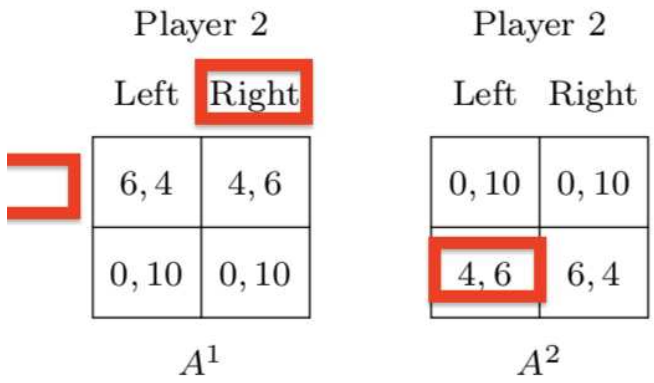
Player 2	
Left	Right
0, 10	0, 10
0, 10	10, 0

A^2

(a) Non-revealing (NR) game

L'équilibre du jeu révélé, consiste, pour le joueur 1 à ne pas révéler son information, en adoptant une stratégie mixte sur ses deux actions, sauf à la dernière période.

Expérience : le FR game



(b) Fully-revealing (FR) game

Si l'information était révélée, le joueur 1 obtiendrait 4 dans le premier état de la nature, et 4 dans le second état de la nature.

Révéler son information dès le début. Pour « sécuriser » le payoff de 4, sinon, il obtient en moyenne

$$\frac{4+6+0+0}{4} = 2,5$$

prédictions théoriques

Le tableau suivant indique ce qu'obtient en moyenne le joueur 1 dans ces deux jeux, en fonction du nombre de périodes pendant lequel le jeu est joué.

TABLE 1.3: THEORETICAL PREDICTIONS IN THE NON- AND FULLY-REVEALING GAMES

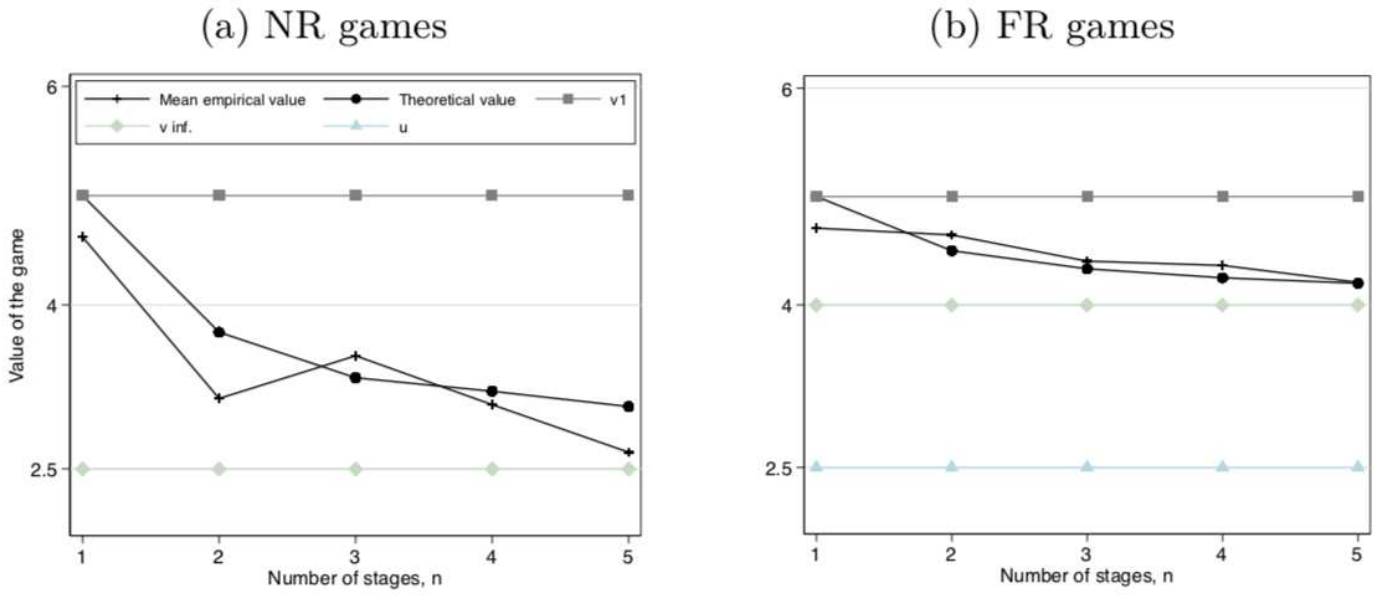
	Value of the game, v_t if t is						Optimal use
	1	2	3	4	5	∞	of information
FR	5.00	4.50	4.33	4.25	4.20	4	Fully Revealing
NR	5.00	3.75	3.33	3.21	3.07	2.50	Non Revealing

Note. Theoretical predictions on behaviour in the NR and FR games. *Source.* Jacquemet and Koessler (2013, p.110), Table 1.

La valeur est décroissante, car, plus le temps avance, moins le joueur 1 peut tirer parti de son information.

Expériences empiriques

FIGURE 1.10: EMPIRICAL VALUE FUNCTIONS



Note. Observed average payoff in the NR and FR games, along with the theoretical upper (v_1) and lower (∞) bounds. *Source.* Jacquemet and Koessler (2013, p.112), Figure 8.

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