Quality signalling by banks on the savings market

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1. Introduction

One of the major issues concerning the dysfunction of the credit market is that of the information available to consumers on the quality of the good offered by the supplier. In the case of the saving market, when a consumer wants to make a deposit at a bank, the main risk he faces is that of bankruptcy of this bank. When bankruptcy occurs, the consumer may loose the whole amount of his deposit, and in turn this may prevent him from going to any bank. This type of situation is quite similar to that described by Akerlof (1970), where, due to the uncertainty on the product quality faced by buyers, the market can disappear.

In such a situation, one is led to ask what kind of mechanisms could improve the information of the consumers on the various banks on the market. Indeed, some of the banks (the "good quality banks", i.e., those who offer a high security for the deposits) should be willing to disclose some information in order to provide sufficient incentives to attract consumers saving. One way of transmitting information is the various signals that the banks may send to the consumers in order to reveal the "quality" of their product, that is, the reliability of their "saving contract".

Of course this question is not new, and the purpose of this chapter is to examine to what extend the results of the literature on quality signalling suits to the problem of asymmetric information on the Russian savings market.

The problem may be stated in a simple form as follows. Assume that on the saving market is present a population of consumers, each of them being endowed by a constant amount s of saving. For simplicity, we assume that $s=1$. Each consumer may either make a deposit with his saving, or keep his money by him. The consumers face a bank which is characterised by its bankruptcy probability This probability may be viewed as the "quality" of the bank. If the bank gets into bankrupt, a consumer who has put his saving in the bank looses it. If no bankruptcy occurs, then the consumer receives the amount of his saving plus the interests, say $1+r$ if r is the lending interest rate offered by the bank.

Each consumer has a utility function reflecting his attitude towards risk. Assume that all consumers are identical and denote by U their utility function.

If the probability ρ characterizing the bank is observable to consumers, then the problem of a consumer is easily solved. It consists in putting its money to the bank if the expected utility of doing so is higher than keeping his saving by him, that is, if:

$$U(1) \leq (1- p)\, U\,(1 + r) + pU(0)$$

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This means in particular that a higher interest rate allows a higher bankruptcy probability. Note also that the above condition as an equality, which defines the combination of probability and lending interest rate that makes the consumer indifferent between making a deposit or keeping his money by him, is in fact sensitive to the amount of saving, a property which is not apparent here due to our simplifying assumption $s=1$.

If ρ is not observable, then the problem should be stated quite differently. Assume that the consumers have the following a priori on the unobservable probability of bankruptcy: this probability may be high $(\rho = \rho^{+})$ with probability π, or *low* $(\rho = \rho^{-})$ with the probability $1 - \pi$. Denote by P the expected bankruptcy probability, that is, $P = \pi \rho^{+} + (1 - \pi) \rho^{-}$. The consumer goes to the bank if $U(1) \leq (1- P) U (1 + r) + PU(0)$.

Therefore, the Akerlof's problem may arise: if the "high quality bank" (i.e., the bank of type ρ^{-} cannot reveal its characteristic through any kind of signalling strategy, it may be unable to offer a probability-interest rate combination that is sufficiently attractive for the consumer, who prefers thus to stay out of the market.

In the context of signalling models, some specific actions (signals) may be chosen by the supplier of the good of unknown quality in order to reveal its type. In some cases, an agent selling a good quality (i.e. a "good type") cannot be mimicked by agents with lower types in the choice of such actions. Then, a "separating equilibrium" occurs, where the consumers, observing that a given action has been chosen, surely infer the type of the sender of the signal: in other words, they know if the seller sells a high or a low quality product, thus avoiding the Akerlof problem. In other cases, such a separation between types is impossible, and only "pooling equilibria" exist, at which all the types choose the same action. Then consumers, when observing the message send by the seller, cannot infer anything.

The literature that starts from the Akerlof problem and that is devoted to signalling models on product markets emphasises mainly three types of signals. First, the price of the product may be used to signal the quality. Second, advertising expenses can also, in some context, reveal the quality. Third, more recently, some more specific signals of product quality have been examined, among others the role of certification of product quality and of labels. We leave apart the case of warranties offered to consumers by suppliers: these warranties consist in the replacement of the product or in free repairing, which is not adapted to our problem.

One important remark is that in these models, the quality is assumed be exogenous: this important feature is very restrictive. In the case of the banking system, the "quality" of the bank, that is, its reliability, is determined by the riskiness of the projects in which it is involved. In particular, the strategy of the bank concerning the choice of the firms it finances determines together with other factors its bankruptcy probability. Then in a complete model, this probability should be endogenous and should reflect the behaviour of the bank with respect to the investment projects that are submitted to it.

In this context, a Stiglitz-Weiss effect may appear: if the bank faces various investment projects, which probabilities of success are unknown, then the choice of a particular interest rate determines the marginal project that is willing to accept a borrowing contract with the bank. An increase in the interest rate leads to an increase in the riskiness of the marginal (and average) project, and such a mechanism explains why, even in the presence of credit rationing, interest rate do not increase

sufficiently to clear the market. If this mechanism is at work, that is, if banks use the interest rate imposed to borrowers in order to select the investment projects, then a bank who fixes a high interest rate to its borrowers should finance more risky projects than a bank whose interest rate is lower. Facing a higher probability of default on the part of its borrowers, such a bank is thus characterised by a higher probability of bankruptcy, and is less reliable. An index of the reliability of a bank may then be the interest rate that it asks to its borrowers. Since the interest rate that the bank imposes to borrowers constrains the interest rate it serves to lenders, a low interest rate on saving should reflect a higher reliability of the bank and may thus be used as a signal of product "quality", understood in the sense of a lower probability of bankruptcy. Another explanation of why the lending interest rates should be lower when a bank exhibits a lower bankruptcy probability is that the bank may incur additional (selection) costs if it gathers some information on each potential borrower. More information allows to have a better idea of the probability of success of the investment and leads to a better selection of the population of borrowers.

These two mechanisms both suggest that a "good type" bank, that is, a bank with a low bankruptcy probability, incur higher costs than a "bad type" bank. We will adopt this assumption in what follows. More precisely, we consider that savers face a bank whose unknown "type" (or quality) is its probability of bankruptcy, and we ask the question of the signals that may be send by the bank in order to signal its quality. A "bad" bank faces a more acute constraint on the interest rate it serves to savers, due to a Stiglitz-Weiss effect on the borrowers side, or to higher selection costs, as mentioned above.

This chapter first recalls the basic principles of signalling games. Then it surveys successively the results concerning three types of signals: prices, advertising, and certification or labels. In what follows, the "quality" of the product must be understood as the complementary probability of the "bankruptcy probability" of the bank, and the "price" as the opposite of the interest rate.

2. Signaling models

The models devoted to signalling all derive from the idea of Spence (1970). In these situations, two economic agents have to exchange a good. Some attributes of the good (say, the quality of the good) are unknown by the buyer, who thus has an informational disadvantage. The unknown quality of the good is referred to as the "type" of the seller. This situation may lead to the breakdown of the market, like in the above mentioned Akerlof's problem, unless the seller can use some specific actions in order to reveal information on the quality of its product. The major problem that arises is that low quality sellers may want to appear as high quality ones, and mimic the action chosen by high quality competitors. Signalling models ask the question of whether high quality sellers can choose actions that cannot profitably be undertaken by low quality sellers. If this appears to be true, then the signal allows revelation of the unknown type (and the equilibrium of the corresponding game is called a "separating equilibrium"), if not, then various types cannot be separated through the signal, (the equilibrium is called "pooling equilibrium").

This kind of situations can be represented by a game, which general characteristics are the following. Initially, buyers have only an "a priori belief" on the

quality, which is a distribution over the possible types of the seller (that is, a probability distribution over the possible qualities of the product). Then the seller chooses an action, the signal, in the set of possible actions. According to the economic situation, this signal can be a price, an advertising expenditure, a R\&D expenditure, the choice of a label, and so on.

Observing the value of the signal, the buyers then revise their a priori into a new belief (the a posteriori belief) according to Bayes' law, and express their demand for the good.

A (perfect bayesian) equilibrium of this game is an action (i.e. a signal) of each possible type of the seller and a set of revised beliefs of the buyers such that whatever his type, the seller has no incentive to change his action, and this action and the beliefs are consistent (that is, buyers have no incentive to change their beliefs if the seller has sent this signal).

This equilibrium may be separating, pooling or semi separating. A separating equilibrium is an equilibrium where the action chosen by the seller reveals perfectly its type: when observing this signal, buyers learn what is the quality of the product. This corresponds to the fact that whatever its quality, the seller has no interest to behave as if he were another type (and consumers know this). In this type of equilibrium, the signal sent by the seller is endogenously credible: it is so because no other type would have undertaken the same action. A (totally) pooling equilibrium is one in which the seller cannot signal anything through signalling, because all the other types have always an interest to imitate his behaviour. Buyers thus do not learn anything when they observe the action and keep their a priori belief. A semi separating equilibrium exhibits both kinds of situations: among all the possible qualities of the seller, some can signal themselves through signalling, and some others are pooled, that is, are unable to distinguish themselves from one another.

The basic idea is that in some circumstances, the signal sent by a seller of a given quality is more costly than if it were sent by a seller of another quality: then this signal cannot credibly come from the other types, and allows perfect revelation.

Therefore, since the signal is rationally interpreted by the receivers, it need not to be directly informative on product quality. For instance, advertising can convey direct information on the quality of the product, but it can also be used as an indirect signal in the sense where a given amount of advertising expenses would not have been profitably been spent by another seller offering another quality. Note that all these models therefore rely on an extreme rationality assumption on the part of buyers, who must be able to interpret the signal correctly, revise their beliefs rationally, and infer the new probability distribution over the quality they face.

3. The role of prices as signals of product quality

The most commonly studied mean of signal of quality is the price of the product. In our context, the idea is that the bank could in some cases signal its quality (i.e. its bankruptcy probability) through the interest rate on saving deposits.

The literature on prices as a signal of product quality has explored two lines, according to whether the product gives raise to repeated purchases or not.

In a context of adverse selection, that is, one in which the bank is characterised by a given exogenous "quality", involving thus no moral hazard problems, the problem of the bank is to attract savers. When savers face a repeated decision, one

solution for the bank is to attract savers through a high interest rate (which plays the role of a low introductory price in usual models). However, savers may infer that the quality is low (see above analysis). Then the problem becomes: has a good quality bank more incentive to offer a higher (or a lower) interest rate than a low quality one?

Nelson (1974) suggests that two effects appear: first, if the bank has a low bankruptcy probability, a consumer who has "tried it" has experienced less losses (or, here, has less often lost his money), which should generate future deposits. Therefore, a saver who had a successful experience with a bank is likely to generate more future deposits. This first partial effect indicates that a high quality bank should be more willing to attract savers through a high interest rate (thus loosing current profit) than a low quality one. On the other hand, a good quality bank incurs higher costs (see above) and this suggests that a low quality bank should make higher profits (if it does not get bankrupt) on any saver; and has thus more (short term) incentive to attract customers. Since its costs are lower, the low quality bank can always duplicate the strategy of the high quality one by offering a high interest rate, and it results that a separating equilibrium (i.e. an equilibrium where high and low quality suppliers do not adopt the same price) requires that the advantage in profits induced by repeated deposits must exceed the short term advantage of a low quality bank due to lower costs.

In this particular context, a high interest rate signals a good quality bank. Moreover, as times goes, the high quality bank has an incentive to lower its interest rate.

But in another context, the opposite result may also appear, that is, a low interest rate could also signal a high quality. This is the case in the Bagwell and Riordan (1986) model where the high quality firm signals its quality through high prices. This firm incurs higher production costs, thus a low quality producer is more reluctant to decrease demand than a high quality one. In this model there are also new consumers at each period. Consumers of previous periods become informed and this reduces the incentive to signal: this can lead to a decreasing price over time.

When the situation involves moral hazard, the problem is completely different. In this case, the bank can (through a better selection of its risky activities) change its bankruptcy probability at each period. Then the way it can signal its quality depends on its ability to build a reputation of high quality. Models that investigate the question of "quality premium" consider the relation of a supplier and buyers as a repeated game, where the retaliation that consumers can impose on the supplier is to stop buying if the product has been bad at the previous period. Repeated purchases then provide an incentive to the supplier to offer good quality when consumers learn quality quickly and repeat their purchases often, two conditions that are obviously not met in our context: first, unless bankruptcy occurs, consumers do not learn immediately the quality of the bank (observing no bankruptcy, they just revise their belief on the probability accordingly). Second, making a deposit is not necessarily frequent. Thus the problem of a deposit at a bank faced by savers is more a "durable good" type problem: in these models, the unobservable characteristic of the good is its durability (a feature which is not observable as immediate quality can be) and by definition, purchases are not repeated frequently.

4. The role of advertising

Advertising may be viewed as a mean of signalling the quality of a product or a service: in models around this line, advertising involves a wasteful expenditure which is observed by consumers, who can then use this observation to infer information about the quality of the product. Like in other problems of quality signalling, the problem here is to know whether a firm can credibly signal its quality by choosing some specific advertising action, that is, if these actions can or not be mimicked by low quality firms (see Nelson 1974).

In fact, the producer has two instruments for signalling: the advertising expenditures and the price of the product. Clearly, advertising expenditures may be viewed in the same way as a low introductory price, since actions both actions signal that the firm is willing to sacrifice profits now. In order to obtain such a result, it must be true that consumers can interpret this signal as the fact that the firm will still be present on the market at future periods and will make additional profit to recover its initial cost.

5. The role of certification and labels as signals of product quality

Certification of product quality or of the production process on the one hand, and collective labels on the other, are explicitly designed by public authorities in order to induce revelation of product quality by firms.

Certification of product quality and labels guarantee that a given level of quality is reached by the product or the service itself, whereas certification of the production process (like the ISO 9000 norms) concerns mainly the internal organisation of the firm.

However, certification and labels differ in a number of features. Certification of product quality consists in the announcement by a firm that a given level of quality is reached by the product. The firm determines, together with a "certification body", the characteristics of the product that will be controlled and revealed through certification; then the certification body performs audits and controls, and consumers are informed about the quality level through an appropriate packaging or announcement. The credibility of these announcement are supposed to be guaranteed through two characteristics of the certification process: first, the certification bodies are independent of producers; second, they are themselves controlled and accredited by the public authority.

The main characteristics of the certification process are the following: first, it constitutes a private signal of product quality: the firms chooses itself whether to certify the product or not, it determines independently the level of quality that is guaranteed to consumers, and incurs the corresponding costs (mainly the costs associated to audits, controls and announcements). In western countries, a number of industrial and food products, but also services (like banks, hotels) are involved in such processes.

Certification of ISO 9000 type and labels, by contrast, are collective signals. Labels, for instance, consist in a minimum quality level defined by a public authority. A firm who wants to enter the label has to have its product controlled by an independent institution in order to check that this minimum quality level is reached by the product. If this is the case, then the firm can exhibit the label, but within the

collective label, individual quality levels cannot be distinguished. In the case of ISO\ 9000 norms, it is the production process itself that has to exhibit some specific quality requirements (concerning, for instance, the organisation of the R\&D service or the way the quality of production is controlled at the internal level). Since the characteristics that are controlled concern mainly the production process, this type of certification is mainly useful to other firms (suppliers or buyers of intermediate goods, partners in commercial relationships or common R\&D projects, insurance companies, etc...) or to third parties in litigation concerning the quality of the products. This last type of certification is widely used by industrial firms, but also more and more by suppliers of services. A problem frequently noted is the fact that firms that benefit from ISO 9000 certification often use this as an advertising argument towards consumers, which is misleading since consumers may think that the product itself (and not the production process) is certified. This problem has been put forward recently, in particular, in the banking sector.

We now develop the simple economics of certification and labels, and then derive the policy implications of these results.

5.1. The economics of certification

In order to see how certification may be used as a signal of product quality, let us use the following set-up (see Linnemer and Perrot 1996). Assume that a firm offers a good which quality υ cannot be observed by consumers. Consumers think that quality is a priori distributed over an interval $[a,b]$ according to a uniform distribution. When the firm does not provide any signal about product quality, then consumers think that quality is the a priori average quality, that is: $\bar{\upsilon} = (a + в)/2$. To simplify the discussion, assume that the production cost of the firms are zero. The firm only incurs certification costs if it chooses to certify its product.

Assume first that the firm has no mean of signal. Consumer then have the belief $\bar{\upsilon}$ on the quality. Let $D(\bar{\upsilon},p)$ be the demand of consumers conditional to this level of expected quality if the price of the good is p. Let $p^{м}(\bar{\upsilon})$ be the monopoly price of complete information conditional to this level of expected quality. The profit of the firm in this situation of unobservable quality is denoted $\pi^{м}(\bar{\upsilon})$.

Now assume that the firm may choose to certify its product: certification implies the payment of a fixed cost $(к)$. If the firm decides to certify, then it discloses the information on its quality and announces to consumers that the true quality of the product is (υ). In this economy "with certification", consumers receive a double signal on the product: on the one hand, they observe if the product is certified or not; on the other hand, they observe the price of the product.

When they face a certified product (that is, the firm announces that the quality is υ), since this information is credible, consumers revise their beliefs on quality and learn that the quality is indeed υ. Therefore, the firm prices at the corresponding monopoly price of perfect information corresponding to υ, that is $p^{м}(\upsilon)$. The firm then obtains a profit (gross of certification costs) equal to $\pi^{м}(\upsilon)$ and a net profit $\pi^{м}(\upsilon) - к$.

When the product is not certified, consumers also revise their beliefs on product quality: they think that the quality of the product is equal to the average quality of a non certified product. Let denote by $\bar{\upsilon}^{NC}$ this average quality. Then the

firm can price at the monopoly price corresponding to this average quality. Let denote by $p^м(\ \bar{\upsilon}^{NC})$ this price and by $\pi^м(\ \bar{\upsilon}^{NC})$ the corresponding profit.

The problem is to determine the (perfect Bayesian) equilibria of such a signalling game, that is, which firms choose to certify and which don't, and what are the beliefs of consumers at equilibrium. It is very intuitive that since certification is costly, the profitability of certification for a given firm depends on the increase in quality that information disclosure allows, compared to the certification cost. Hence, it depends both on the valuation of quality by consumers and on the costs associated to controls and audits.

In our context, where quality refers to the bankruptcy probability of a bank, one can think that consumers are probably highly interested by such an information, and a bank whose degree of reliability is high should face a much higher demand than a bank whose quality is unknown.

The trade off faced by a firm of quality υ is the following :

if $\pi^м(\ \bar{\upsilon}^{NC}) \geq \pi^м(\upsilon) - \kappa$

then the firm does not certify,

if $\pi^м(\ \bar{\upsilon}^{NC}) \leq \pi^м(\upsilon) - \kappa$,

then it does.

In case of equality, the firm is indifferent between both strategies.

Then the equilibrium of the signaling game can be easily derived: there exists a limit value of the quality, say $\tilde{v}$, such that if the true quality is lower than $\tilde{v}$, the firm chooses not to certify and if it is higher, the firm chooses to certify; then consumers revise their belief on quality and attribute to a non certifying firm the average quality of the firms who don't certify, that is $\bar{v}^{NC} = \dfrac{\tilde{v} + a}{2}$.

If the firm chooses to certify (that is, if the true quality υ is higher than $\tilde{v}$, it discloses the true quality of its product, and since this information is credible, consumers revise their beliefs into the true quality υ.

An interesting point is to note that the limit value that determines the certification strategy $\tilde{v}$, is increasing with κ. In fact this result can be easily understood with the following argument: assume that the certification cost κ is zero; then any firm whose quality is higher than the average a priori quality $(\ \bar{\upsilon}\ )$ has certainly an incentive to certify, since this allows to price at $p(\upsilon)$ instead of $p(\ \bar{\upsilon}\ )$. Conversely, if a firm whose quality is lower than $\bar{\upsilon}$ does not certify, its quality is evaluated at $\bar{\upsilon}^{NC} = (a + \bar{\upsilon}\ )/2$ by consumers. But then, a firm between $\bar{\upsilon}^{NC}$ и $\bar{\upsilon}$ prefers to certify, since it doesn't want to be pooled with lower qualities. Thus the same argument prevails: the quality of a firm who doesn't certify is evaluated at $(a + \bar{\upsilon}^{NC})/2$, which induces a firm with quality between a and $(a + \bar{\upsilon}^{NC})/2$ to certify, and so on. It results that when the certification cost is zero, all the firms certify their product (in this case, $\tilde{v} = a$, and the limit value $\tilde{v}$ increases with the certification cost κ (when κ becomes very higher, no firm certify).

The consequence of this result is that many firms loose due to the possibility of product certification in the economy. This is a generic result of signaling games: when the possibility of sending signals on the quality appears, low qualities loose because they cannot be taken for high (or average) quality. An interesting result is that when the certification cost is positive (the most realistic case), some firms who

certify with a quality above the a priori average quality $\bar{\upsilon}$ loose with regard to the world where certification doesn't exist[1]. This is because the existence itself of an institution like certification forces revelation of product quality on the part of firms who do not gain from it, due to the simple fact that if these firms choose not to certify, consumers think that their quality is even lower than it is.

Another important feature of this economy with certification is that consumers are submitted to opposite partial effects according to the value of the true quality of the product: compared to a situation where certification does not exist, consumers may learn after the introduction of this possibility that the quality is high or low. In the first case, they incur a higher price, and they benefit from a lower one in the second. It results that the comparison between the ex ante and ex post situations of the consumers depends on the rate of substitution between quality and price in the consumer's surplus: the increase in price due to a disclosure of a high quality may (or not) overcome the positive effect of the perception of a high quality. Conversely, when the quality of the good is proved to be low, an economy with certification also leads to a lower price of the good. The result on the consumers' surplus may be positive or negative, depending on the monetary valuation of quality by consumers.

In the case of the quality of the banking services, this valuation, which can be measured by the answer to the question "what is the reduction in the lending interest rate that would compensate for an decrease in the bankruptcy probability?", depends on the degree of risk aversion of consumers. If consumers are highly risk averse (that is, they are willing to accept a large reduction of the interest rate in order to benefit from a reduced probability of bankruptcy), then they will benefit from the existence of certification because the decrease in the interest rate induced by the revelation of a high quality will not compensate for the increase in utility due to the high quality. If consumers have a low degree of risk aversion, they may suffer from the introduction of certification for the symmetric reason.

From the point of view of policy implications, we have thus the following results:

1. If consumers are highly risk averse, the public authority should create the institution that allows certification of banking services.

2. Such an institution forces revelation of quality of services more than banks would and is not necessarily beneficial to the banking system as a whole: only good quality banks would benefit of this system, lower quality ones being reluctant to involve into a certification process, due to certification costs.

3. Subsidies of certification costs is paradoxically detrimental to low qualities: high certification costs allows to remain hidden when quality is low, because the equilibrium limit value beyond which certification becomes profitable increases with certification costs. Thus the perceived average quality of a bank who chooses not to certify is higher when the certification cost is high.

4. It results that if the public authority aims at a large information disclosure (no matter the adverse effects that such a policy may have on low quality suppliers),

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[1] More precisely, there is a limit value, $\hat{v}$,defined by the $\pi^{M}(\upsilon) = \pi^{M}(\hat{v}) - \kappa$, under which any firm prefers to belong to an economy without certification and beyond which certification is profitable.

then it should subsidize certification. The limit case where the costs incurred by a bank who certifies is completely subsidized leads to full revelation of information.

5. A major issue is of course that of the credibility of the information revealed by certification. This can only be reached by the complete independence of auditing and control institutions with respect to banks, and by the reliability of the certification bodies themselves.

We now turn to the analysis of collective labels.

5.2. An economy with collective labels

By contrast with certification, a label that guarantees a minimum level of product quality is a collective signal, in the sense where all the firms involved in the label benefit from the same consumers' belief on their quality. Some specific problems are associated with such a collective signalling institution. In order to analyse them, we consider the simple following framework.

As before, the quality of the good is unobservable and is supposed to be a priori uniformly distributed over an interval *[a,b]*. The public authority defines a minimum quality level, say $\underline{\upsilon}$, such that any firm whose quality is above this threshold may participate in the label, and any firm whose quality is below $\underline{\upsilon}$, must stay out of the label.

A firm whose quality υ is high enough can choose to stay out of the label. If it decides to exhibit the label, it has to incur the corresponding cost (again auditing, controls, and so on); let l be this cost.

The signalling game is thus as follows: according to the value of its true quality, the firm first decides to belong to the label or to stay out, and then chooses its price. Observing both the signal "label" or "no label" and the price of the product, consumers then revise their beliefs on quality, and form their demand accordingly.

A (Bayesian perfect) equilibrium of the signalling game with label consists in a pair of decisions (label, price) of the firm for each possible value of its type, and a set of revised beliefs such that the firm has no incentive to change its strategy and the actions of the firm and the consumers' beliefs are consistent.

The credibility of the label implies that consumers cannot think that the quality of a firm who sells a labelled product is lower than $\underline{\upsilon}$.

When a firm (with quality υ higher than $\underline{\upsilon}$ enters the label, it benefits from a belief on its quality which is equal to the average quality of the firms who enter the label. This mechanism, which is intrinsic to the fact that the label is a collective signal, creates a co-ordination problem: the optimal action of each type depends on the consumers' belief on the average quality of a firm in the label, which in turns depends on the optimal action of the other types. Similarly, a firm which stays out of the label (either because its quality is lower than the threshold $\underline{\upsilon}$, or because it is higher but it has decided to stay out of the label) benefits of a belief on its quality that is equal to the average quality of non labelled product.

Let υ^l be the consumers belief about a labelled product, and υ^{nl} the belief on a non labelled product. Each of these beliefs is obtained as the expectation of quality on the appropriate interval, that is: $\upsilon^l = E(\upsilon / type\ \upsilon\ is\ in\ the\ label)$ and $\upsilon^n = E(\upsilon / type\ \upsilon\ is\ not\ in\ the\ label)$. Of course, we have: $\upsilon^l \geq \underline{\upsilon}$. Facing a labelled product, consumers revise their beliefs into υ^l and their demand function, conditional to this expected

quality is $D(\upsilon^{l},p)$. Facing a non labelled product, consumers revise their belief into $\upsilon^{n^{l}}$ and their demand function is $D(\upsilon^{n^{l}},p)$. Therefore, the supplier of a labelled product can price at the corresponding perfect information price, say $p(\upsilon^{l})$ and obtains the corresponding gross profit $\pi(\upsilon^{l})$. The profit net of label costs is thus $\pi(\upsilon^{l}) - l$. A firm which stays out of the label prices at $p(\upsilon^{n^{l}})$ and receives $\pi(\upsilon^{n^{l}})$. As the definition of υ^{l} and $\upsilon^{n^{l}}$ show, the profit of any type depends on the decision of any other. This is in sharp contrast with the certification case, where the signal sent to consumers is purely private. The trade off faced by a firm of quality $\upsilon \geq \underline{\upsilon}$ may be written as follows:

if, $\pi(\upsilon^{n^{l}}) \geq \pi(\upsilon^{l}) - l$, then stay out of the label;

if $\pi(\upsilon^{n^{l}}) \leq \pi(\upsilon^{l}) - l$, then enter the label.

It is first easy to see that, since the values of $\upsilon^{n^{l}}$ and υ^{l} that appear in these inequalities are endogenous and depend on the type of co-ordination that prevails, two situations may appear at equilibrium: either all the types that may enter the label (i.e. types in $[\underline{\upsilon}, b]$) in fact do, or none of them does.

The equilibrium configuration thus depends on the optimal decision of the limit firm $\underline{\upsilon}$, that is, the firm whose quality just allows to enter the label. This firm may anticipate that it will be the only one in the label (which consumers would then observe). Then $\upsilon^{l} = \underline{\upsilon}$. Or it may expect that all firms that can enter the label will indeed do: then $\upsilon^{l} = \dfrac{\underline{\upsilon} + b}{2}$.

These remarks lead to the following results: if $\underline{\upsilon} \geq \bar{\upsilon}$, (which means that the label is relatively strength), then if the label cost is not too high (namely, $\ell \leq \dfrac{\underline{\upsilon} - \bar{\upsilon}}{4}$ then all the types in $[\underline{\upsilon}, b]$ choose to label their product. If the label cost is higher, then two types of situations may appear: one where all the authorized types ($[\underline{\upsilon}, b]$) label, the other where none of them does.

if $\underline{\upsilon} \leq \bar{\upsilon}$, (the label is not too strength) then both types of equilibrium always exist.

A number of consequences derive from these results: first of all, a label which is quite strength may "fail", in the sense where, due to co-ordination problems, some firms, anticipating that higher types wont enter the label, benefit from staying also out of the label. If a form of co-ordination emerges on the decision, however, the label may "succeed", provided that the cost is not too high. It is also worth noting that for low label costs, the more strength the label, the higher the probability of success of the label.

5.3. The choice between label and certification

Some interesting policy implications derive from these results (see Linnemer and Perrot, 1997). Imagine that both labels and certification are available for firms who want to signal their qualities. Assume that the label cost l is lower than the certification cost κ, an assumption which seems quite reasonable since the controls associated to a collective label are common to a number of firms while certification entails a set of individual audits.

Then firms whose quality stands above the label threshold face the following trade-off: entering the label is associated with a lower cost, but does not allow perfect revelation of information on quality, since each quality in the label is pooled with any other. On the opposite, certification allows complete revelation of the quality, but at a higher cost.

Joint to the fact that the label may lead to two types of equilibria (one with co-ordination on the label, one without), it results that in an economy with both means of signalling quality, a number of configuration may prevail at equilibrium, depending on the respective values of signalling costs, on the level of the label, and on the type of co-ordination.

It is worth noting that creating a label in an economy where certification already exists may be harmful if the aim of the public authority is to obtain the best possible information on quality (in order, for instance, to reduce search costs incurred by consumers). Indeed, firms who choose to certify their quality initially may now prefer to switch to the label since it is less costly. While information on their quality was perfect under certification, all these qualities are now pooled and benefit from the same belief, which corresponds to the average quality of the label.

In other configurations, it may also happen that introducing a label in the economy can be beneficial if firms who did not reveal anything now choose to participate in the label.

Therefore, it is not necessarily true that the multiplication of signalling institutions is welfare improving, and one has to compare carefully the initial and final equilibrium configurations.

6. Towards a policy in favor of information disclosure

The interesting consequences of the economics of labels and certification are that policy interventions may change the incentives of banks to provide information about the quality of their services.

The objective of the public decision maker may be of various types: the public authority may want to protect consumers (in the sense of maximizing only the consumers' surplus), or simply maximize the global welfare. It may also just act in favor of the provision of information on the market (for instance, the objective may be the minimization of search costs, or the minimization of the risk incurred by savers). In this last case, encouraging advertising expenses may be enough since these expenses may play the role of signals of product quality. However, it is worth noting that indirect signals of product quality (like the use of prices or advertising expenses) need an assumption of ultra rationality on the consumers' side: consumers must be able to compute the optimal price (or advertising level) of any possible type they may face, and infer from the received signal the Bayesian revision of their belief on quality. Or course, this is true in any signaling game. However, when the signal consists directly in an information about the quality level, less computational capacities are required from the consumers. In the case of certification, for instance, consumers only have to interpret correctly the fact that a firm doesn't certify, the information delivered by a firm who does being quite straightforward. In the case of labels, things are a bit more complex since the quality of a labelled product depends on the whole range of labelled qualities.

Moreover, dissipative advertising is also wasteful even if it carries information on the product quality: more efficient and direct signals like labels or certification may thus be preferable.

The benefits that the economy may obtain from the creation of such official institutions greatly depend both on the objective of the public authority, and on the costs of the label and/or certification procedure. A number of questions arise: should the public authority favour labels or certification (and thus create the appropriate institutions), or both? Should the cost of such procedures be subsidised? Do these mechanisms favour mainly consumers or banks?

First of all, one should remark that certification conveys a more precise information about the product than labels, since it perfectly reveals quality, whereas belonging to a collective label confers to the product the average quality of labelled product. It results that a public authority who aims at promoting the best possible information (because it wants to minimise search costs incurred by consumers) should favour more certification than collective labels. However, since certification is an individual process, certification costs are usually higher than labels costs. There is thus a trade off between the collective advantage induced by certification and the total costs incurred by the economy as a whole.

Concerning subsidies of the label and certification costs, a lot of insights result from the above analysis. First, recall that the perceived quality of a non labelled or a non certified product is the average quality of the firms who don't certify, and the higher type who decides not to certify increases with the cost associated to certification. It results that a bad quality firm (i.e. a firm who chooses not to certify) prefers a situation where the certification cost is high: when this cost is subsidised, it diminishes the threshold under which a firm is forced to reveal its quality, and this revelation is harmful for low quality products.

On the opposite, high quality firms (those who would have certified even with non subsidised costs) benefit from lower costs.

On the consumers' point of view, the global effect of a subsidisation of label or certification costs is the result of various partial effects that may be stated as follows:

- first, one must note that since the certification or the label costs are assumed to be fixed here, subsidisation doesn't change directly the interest rate that consumers enjoy on their saving; however, as subsidisation of these costs induces different certification or label strategies from banks, it has indirect effects on the interest rates served on saving deposits;

- when savers are risk averse, more information on the bankruptcy probability of a bank should increase the incentives to participate in the saving market instead of keeping money aside; thus as subsidisation increases the interval of types of banks who choose to reveal information, it enhances the information available to consumers who thus, on this point of view, benefit from lower certification costs;

- once information on the quality of its services is disclosed, the bank can offer the perfect information interest rate; therefore, savers benefit from higher interest rates when the bankruptcy probability is higher; conversely, they face lower interest rates on the part of high bankruptcy probability banks. This again induces a trade off which result may be either beneficial or detrimental to consumers.

7. Conclusion

As this chapter shows, various signals of product quality, analyzed by the classical literature, may be used to improve the functioning of the saving market when characteristics of banks (and in particular their bankruptcy probabilities) are unobservable.

Among the signals studied by this literature, three of them have been successively presented: first, we have examined the role of prices as providers of information on the hidden quality; second the results concerning advertising as a signal of product quality have been recalled, and the third part has been devoted to institutional means of transmitting such information, that is, certification of product quality and labels. What conclusions can be drawn from this literature on the saving market in Russia?

First, if one of the common underlying arguments of all these models is the rationality of consumers, one must recognise that this assumption is much more extreme in the case of prices and advertising than in that of certification and labels. In the first type of models, consumers are supposed to be able to compute the optimal strategy (price level or amount of advertising expenses) of each possible type and to revise their belief on quality according to Bayes' rule; the information acquired on quality through such a mechanism is quite indirect, since the signal is not a quality level but consists in another decision variable. On the opposite, certification or labels allow to transmit directly information on quality, whose interpretation doesn't require thin computational abilities or extreme rationality. Such signals can thus be more easily interpreted by economic agents.

Second, certification and labels both need the intervention of the public authority and of independent firms (the certification bodies) in order to build the appropriate institutions and to guarantee the credibility of information. This may both appear as an argument for and against this type of signals. The intervention of different agents at different stages of the process may on the one hand provide a better insurance against falsification of the information. It also may complicate the process and generate various kinds of administrative costs, additional principal-agent type problems, or even increase the risks associated with the capture phenomenon.

Third, in the context used in the present analysis, we have assumed that costs generated by certification or labels are fixed costs. Therefore, these costs do not change by themselves the interest rates faced by savers (only the fact that the bank service is certified or not does). Thus certification and labels are more efficient ways of signalling the quality than prices or advertising expenses, since for instance, prices are distorted with regard to the complete information case when they are used as signals. It results that if costs associated with certification and labels are mainly fixed, these signals should be preferred to other distorting signals. If these costs are mainly variable costs, then certification, while increasing the marginal production cost of the bank also drives prices upward. In this case, the distorting effects of each type of signal have to be compared in order to derive clear policy implications.

Finally, in most countries, there exists a complex system of guarantees and insurance, which relies mainly on the government, and which provides to savers a number of information on the reliability of banks. Therefore, the various signals that may be used by banks in order to provide additional information on their "quality"

appear mainly as a mean of decentralising the revelation of information and putting it in the hands of the banks themselves instead of that of the government.

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