

CHAPTER 10

FAMILY TIES, INCENTIVES AND DEVELOPMENT

A MODEL OF COERCED ALTRUISM

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I. INTRODUCTION

THE strength of family ties appears to vary across countries and over time. In a recent paper, Alesina and Giuliano (2007) find that the strength of family ties has significant effects on various economic outcomes, such as labor market participation, the extent of home production and geographic mobility. Furthermore, it has been argued that individualism was an important force behind the Industrial

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Revolution in England. For example, Max Weber thought that “the great achievement of . . . the ethical and ascetic sects of Protestantism was to shatter the fetters of the sib [the extended family]. These religions established . . . a common ethical way of life in opposition to the community of blood, even to a large extent in opposition to the family”. (1951: 237). In his view, a strong sense of solidarity among members of the extended family, coupled with a hostile attitude towards strangers, promotes a culture where nepotism may thrive and counter the efficient development of markets. Likewise, Banfield (1958) thought that the “amoral familism” that he observed in certain parts of Italy was an impediment to economic development.

Motivated by the evidence that family ties vary in strength across cultures, we here pursue the line of thought suggested by Weber, by way of theoretically analysing the effects of family ties on risk-sharing and incentives. We all face risk in the form of unknown realizations of future states of the world. Risk may in turn lead individuals to seek to pool resources and thereby mitigate severe adverse income shocks on the individual level. However, insurance markets are not well developed everywhere, and where markets are poorly developed the extended family tends to be an important source of insurance.¹ This observation leads to the following questions, which we seek to answer here. First, how does the insurance provided within the family affect work incentives for its members? Second, does such informal insurance represent an improvement compared to autarky, that is, each individual living by him- or herself without any access to insurance whatsoever? Third, can informal family insurance be sustained as a robust social norm in a society exposed to norm perturbations and migration opportunities? Fourth, can actuarially fair formal insurance, either by way of a compulsory and efficient social security system or by way of a perfectly competitive insurance market, outperform informal family insurance?

Since formal insurance pools the resources of a much larger number of individuals than informal family insurance does, it is to be expected that perfectly competitive market insurance would be more efficient than informal family insurance. However, while this certainly is true at a fixed level of individual risk, and with verifiable information about individuals’ actions (here, work efforts), this reasoning neglects the fact that individuals’ incentive to undertake risk-reducing efforts depends on the level of insurance and how the insurance is conditioned on their (verified) actions. Such moral hazard phenomena are analysed in Helpman and Laffont (1975), Arnott and Stiglitz (1988, 1990) and, more recently, Bennardo

¹ In 2003 the total value of insurance premia (life and non-life) as a percentage of GDP was 12.48 in the US, 9.85 in France, 1.42 in Turkey and 1.74 in Mexico (OECD 2005). In their survey on private transfers between households, Cox and Jimenez (1990) conclude that in developing countries 20–90% of households receive (private) transfers, which can represent up to 20% of the average household income. In the US the corresponding figures are 15% and 1%, respectively. Since the average income of donor households exceeds that of recipient households (Cox, Galasso and Jimenez 2006), these transfers appear to provide some insurance. Using data from Thailand, Miller and Paulson (1999) show that remittances respond to shocks to regional rainfall.

and Chiappori (2003). Since formal insurance under such asymmetric information lowers the incentive for risk-reducing efforts, a competitive insurance market equilibrium can at best sustain partial insurance. While individuals' actions typically are their private information with respect to insurance companies, this is typically not the case, at least not to the same extent, with respect to family members who provide informal insurance to each other. Hence, one cannot rule out a priori the possibility that informal family insurance may outperform formal (market or public) insurance in some cases. One purpose of this chapter is to explore this possibility theoretically.

The family, on the other hand, may be particularly vulnerable to the Samaritan's dilemma (Buchanan 1975), which arises due to an altruist's inability to be committed to not helping out a person in need. This has been shown to lead to several inefficiencies, including suboptimal savings (Lindbeck and Weibull 1988) and underinsurance by poor individuals (Coate 1995). It further seems empirically relevant to study a closely related but distinct form of family tie, namely, the giving of transfers because of others' expectations rather than because of an "inner motive". Amartya Sen has long urged economists to seek a deeper understanding of the implications of the fact that people make many decisions within the realms of the family (see Sen 1983). As Sen put it: "The mixture of selfish and selfless behavior is one of the most important characteristics of group loyalty, [a mixture which] can be seen in ... kinship relations" (1987: 20). Such a tension between, on the one hand, the individual's selfish desires and, on the other hand, the surrounding society's expectations and social norms may be an important explanatory factor behind differences in economic growth and the different degrees of development in the world. An individual who lives in a society where he or she is expected to share his or her income with other family members, sometimes even with such relatively distant family members as first or second cousins,² may rationally expect to have to transfer so much of her income—if she is more successful than the others in the family—that the motive for making the effort in the first place is diluted. The same phenomenon occurs in partnerships between individuals who share output.

To study these questions we analyse a relatively simple model in which risk-averse individuals choose a costly risk-reducing action, "effort", that determines the probability distribution over output levels, as in Pauly (1974). We model the motive for sharing resources within a family as a mixture of voluntary and socially coerced altruism, or as a mixture of sympathy and commitment (as in Sen 1983).

² Dostie and Vencatachellum (2006) find that among 500 domestic workers in Tunisia, 40% see all their wages transferred directly to their fathers; among those who make voluntary transfers instead, the average amount remitted is 40% of their wages. According to Etounga-Manguelle (2000), people with a regular income in today's Africa are not only expected to provide help in emergency situations; they are also expected to finance the studies of younger members of the extended family and to contribute to the many lavish celebrations dictated by social rules; see also Mendelek Theimann (2006).

Voluntary altruism is formalized in the usual way, as a positive weight placed on others' welfare, while coerced altruism is formalized as a culturally or socially imposed norm for intra-family transfers. We determine the equilibrium behavior of individuals in this model, and use these results to seek to answer the questions we have posed. Moreover, we allow for the possibility that the answers to these questions may depend on the underlying riskiness of the environment, which in our model is captured by the ratio of the high to the low output level.

We first study atomistic individuals (with no family ties) living in autarky. The optimal autarky effort does not eliminate the risk of getting the low output. If one could pool the risks of a large number (technically a continuum) of individuals, a welfare-enhancing, budget-balanced insurance policy would thereby come into being. Insurance can only be second-best, however, due to moral hazard (an insurance policy cannot depend on the individual's effort). Since atomistic individuals do not anticipate being helped out by relatives, they would be willing to buy such an insurance policy: insurance markets are expected to develop in societies where family ties are so weak that no resource-sharing occurs within the family, independent of the underlying riskiness.

We then turn to the analysis of insurance provided by the family: formally we analyse this as a strategic interaction between two individuals who care about each other's material welfare, either voluntarily or under the coercion of social norms. An individual's total utility is taken to be a weighted sum of both individuals' material utility, which in turn is determined by each individual's work effort and consumption. The weight put on the other individual's material utility is assumed to be non-negative and not greater than the weight put on one's own material utility. This weight can be interpreted in terms of altruism, or, alternatively, in terms of the esteem derived from others who observe and evaluate one's behavior, such as members of one's extended family, village or society at large. By contrast to Alger and Weibull (2007b), where we assume that altruism alone determines transfers within the family, here we consider situations in which an individual's degree of altruism differs from that enforced by society. More precisely, we suppose that the interacting individuals live in a society with a social norm that dictates a larger transfer than the individuals' own altruism suggests. If the degree of such *coerced altruism* is strong, individuals feel forced to help each other out.³

The players invest effort in production, and output may be low or high. Once the outputs have been realized, these are observed by both individuals, and transfers occur. We assume that an individual is expected to make a transfer to his or her sibling only if his or her own output is high whereas the sibling's is low. We measure the level of coerced altruism by the share of the high output that a rich individual is expected to give to a poor sibling. Consumption is taken to equal the final

³ Many individuals are willing to pay in order to avoid situations where they feel coerced to behave altruistically, even in the absence of potential social sanctions. For recent laboratory studies showing this, see Dana *et al.* (2006) and Broberg *et al.* (2006).

output available to the individual. In our model it does not matter whether or not individuals observe each other's efforts; this is because we focus on the case where utility is separable in effort and consumption.

In solving this two-player game we focus on the case of individuals with the same loglinear preferences over own consumption and effort.⁴ This game has a unique Nash equilibrium. Its qualitative features are as follows. The anticipation of receiving a transfer when poor has a negative effect on an individual's incentive to exert effort. This free-rider effect is well known from other analyses of altruism. Hence, the equilibrium effort decreases as the degree of coerced altruism increases. By contrast, true altruism has a positive effect on an individual's incentive to exert effort: an altruist may exert more effort in order to have more to give to the other individual, an effect we call the "empathy effect" of altruism on effort.

Despite the previous strong emphasis in the literature on the possible moral hazard effect of intra-family altruism, there seems to be a limited number of empirical studies on this topic. Using data on farmer output in Mali, Azam and Gubert (2005) find that remittances from emigrated relatives have a negative impact on agricultural output. By contrast, Kohler and Hammel (2001) show, using census data for Slavonia from 1698, that the number of different crops grown by a family tended to *increase* as the nearby extended family increased. The authors were expecting the opposite effect, namely that as a result of insurance a family would invest less in risk-reducing planting strategies. However, our results suggest that there exists an intuitive explanation for this pattern: when a family expects to help another family out, the expected benefit of the risk-reducing planting strategy is increased.

We then find that while coerced altruism induces "involuntary" transfers *ex post*, such coercion is efficient *ex ante* in the sense that the equilibrium expected utility is higher than it would be in the absence of coercion—this is true even if individuals are selfish, so that no empathy effect arises. In such situations, it is as if social norms play the role of compulsory but informal insurance.

We use the equilibrium analysis to determine a sufficient condition for coerced altruism to be sustained as a social norm in a society with selfish individuals, where those who deviate from the norm suffer an exogenously administered punishment. Numerical simulations suggest that a more severe punishment would be required to sustain a given level of coerced altruism in societies where the underlying riskiness is high. This is quite intuitive, since the benefit from deviating from the norm by not transferring the socially sanctioned share of high output is higher when the difference between the outputs is large.

⁴ This particular game has not been studied before. Most of the literature on altruism, starting with Becker (1974), assumes one-sided altruism (see also, for example, Bruce and Waldman 1990; Chami 1998; Lindbeck and Nyberg 2006). In models with two-sided altruism, typically only one of the players chooses an effort (see Laferrère and Wolff 2006 for a recent survey), or there is no risk (Lindbeck and Weibull 1988 analyse the effect of two-sided altruism on savings, and Chen and Woolley 2001 studies the intra-household allocation of income on private and public goods).

Thanks to the mitigating effect of altruism on moral hazard, risk-pooling between individuals (who cannot observe each other's effort) may outperform a competitive insurance market. Compared to formal insurance among a large number of selfish individuals, the benefit of the empathy effect obtained with altruistically motivated transfers between few individuals (say, within a family) may outweigh the limitation inherent in pooling resources of few individuals, as compared with market insurance that pools the resources of a large number of individuals. We find that this occurs in environments with low underlying riskiness, since the mitigating effect of altruism on moral hazard is particularly pronounced in these environments. It is important to point out that, when comparing market and non-market insurance, we use the same measure of performance, i.e. for non-market insurance we do not take into account the welfare that the individuals derive simply from being altruistic.

Our baseline model is similar to that in Arnott and Stiglitz (1991): they also allow for an endogenous, risk-reducing effort, and they model family insurance as transfers within pairs of *ex ante* identical individuals. They address a different question, however: they ask whether, in the presence of insurance markets, supplemental informal insurance provided by the family improves welfare. Moreover, whereas in our model transfers within the family are driven by altruism, in their model family transfers are the outcome of a joint agreement. Thus, in their model, if the family members can observe each other's effort, the joint agreement specifies that total income should always be shared equally, and it specifies the *ex ante* optimal effort, conditional on equal sharing. Mathematically, this is equivalent to the special case in our model where siblings are fully altruistic towards each other (i.e. each attaches sibling the same utility weight to each other sibling's welfare as to his or her own). Arnott and Stiglitz also study the case where family members cannot observe each other's effort but can enforce transfer agreements: mathematically this is equivalent to the special case in our model where individuals are selfish (attach no weight to their sibling's welfare) and make transfers dictated by coerced altruism.

This chapter also complements a large literature that seeks to determine the potential of non-market insurance in the presence of constraints imposed by limited enforceability. Posner (1980) introduced the idea that non-market insurance could be feasible despite limited enforceability, and Kimball (1988) proved this formally. Coate and Ravallion (1993) characterized the best sustainable non-market insurance arrangement as a non-cooperative equilibrium in a repeated game between with two self-interested individuals. Foster and Rosenzweig (2001) extended this analysis to allow for altruistic individuals, while Genicot and Ray (2003) determined properties of equilibria that deter not only deviations by single players but also by groups of players. Recently, Bramoullé and Kranton (2006) have shown that equilibrium risk-sharing networks where people form pairwise links generally provide partial insurance only. Following the empirical evidence that households are less than perfectly insured in many developing countries (see Townsend 1994, and the

literature that followed his initial contribution), Ligon, Thomas and Worrall (2002) tested the hypothesis that this is driven by limited enforceability. In contrast to this literature, in our model risk is endogenous through individuals' choice of effort, and we ask whether insurance markets can function if uninsured individuals expect to be helped out by their relatives if in need.

Our model is similar to that in Lindbeck and Nyberg (2006), who analyse altruistic parents' incentive to instill a work norm in their children. The incentive stems from parents' inability to commit themselves to not helping their children if in financial need. If the children feel a strong social norm to work (hard), then this reduces the risk that the children will be in need, which is good for the altruistic parents. On the other hand, the parents will suffer with the children if their work ethic is very demanding and the children fail. The parents instill just enough of the social work norm in their children so that these two effects are optimally traded off. While Lindbeck and Nyberg's model is asymmetric—parents are altruistic and move first and children are selfish—our model is symmetric—the two siblings move simultaneously and may be equally altruistic towards each other. Nevertheless, the issues dealt with are related, the models similar in structure, and the parametrization of preferences over consumption and effort identical.

The remainder of the chapter is organized as follows. In the next section we present and solve the basic decision problem of an atomistic individual. We then prove in section III that there exists a welfare-enhancing insurance policy. In section IV we introduce the family by presenting the basic game between two individuals, we show that this game has a unique equilibrium, and we conduct a comparative-statics analysis of the equilibrium outcome with respect to altruism and coerced altruism. We further analyse the sustainability of coerced altruism as a social norm. In section V we compare formal insurance with insurance provided within the family. Section VI concludes by summarizing our main results and by pointing to directions for future work. All of the mathematical proofs are available in Alger and Weibull (2007a).

II. SELFISH ATOMISTIC INDIVIDUALS

We begin by presenting the backdrop, the same baseline model as in the companion paper Alger and Weibull (2007b). Consider a selfish individual who feels no wish or social pressure to help others, living in an environment where insurance is not available. The individual chooses an *effort level* that determines the probability distribution over the possible returns, or *output levels*. The output is either high, $y^H > 0$, or low, $y^L = y^H/\rho$, where $\rho > 1$, the ratio between the high and low output

levels, represents the *riskiness* of the physical environment; this is the fraction to which output is reduced in the “bad” outcome. We think of y^H as the *richness* of the environment.

We assume that an individual who makes an effort yielding a success probability $p < 1$ for the high output level and then consumes an amount $c > 0$ of the output achieves utility

$$u(c, p) = \ln c + \gamma \ln(1 - p), \quad (1)$$

where $\gamma > 0$. Hence, the expected utility associated with any choice of $p \in [0, 1]$ is

$$p \ln y^H + (1 - p) \ln y^L + \gamma \ln(1 - p) = \ln y^H - (1 - p) \ln \rho + \gamma \ln(1 - p).$$

As shown in Alger and Weibull (2007b), this utility specification corresponds to log-linear utility in consumption and effort, with γ as the marginal cost of *effort*, and with a success probability that is exponential in effort, tending to 1 as effort goes to plus infinity.⁵ We will refer to the quantity in (1) as *material utility*. (For a selfish individual as here, utility is material utility, while for an altruistic individual, to be studied below, utility also includes others' material utility).

The success probability p^0 that maximizes expected utility is easily found to be

$$p^0 = \max \left\{ 0, 1 - \frac{\gamma}{\ln \rho} \right\}. \quad (2)$$

We note that the optimal effort level, when positive, is independent of the richness of the environment, y^H , is higher in a riskier environment, and is higher when the marginal cost γ of effort is lower.

Considering the possibility that the probability of success may be zero, the achieved expected material utility, or welfare, may be written:

$$u^0 = \max \left\{ \ln y^H - \ln \rho, \ln y^H - \left(1 + \frac{\gamma}{\ln \rho} \right) \ln \rho + \gamma \ln \left(\frac{\gamma}{\ln \rho} \right) - \gamma \right\}. \quad (3)$$

Welfare is thus increasing in the richness of the environment, y^H , and decreasing in the riskiness of the environment, ρ , and in the marginal cost of effort, γ . The associated achieved expected output level, or *income*, is

$$y^0 = y^L + (y^H - y^L) p^0 = \max \left\{ \frac{1}{\rho}, 1 - \left(1 - \frac{1}{\rho} \right) \frac{\gamma}{\ln \rho} \right\} y^H.$$

Hence, the national income of an isolated country inhabited by such selfish individuals would be increasing in the richness of their environment and decreasing in their cost of effort. For low levels of riskiness, effort is not worthwhile at all, and then national income is decreasing in the riskiness, while for high levels of

⁵ Let $x \geq 0$ be effort, let $u = \ln c - \beta x$, and let $p = 1 - e^{-\theta x}$, for $\beta, \theta > 0$. This is equivalent to (1) for $\gamma = \beta/\theta$.

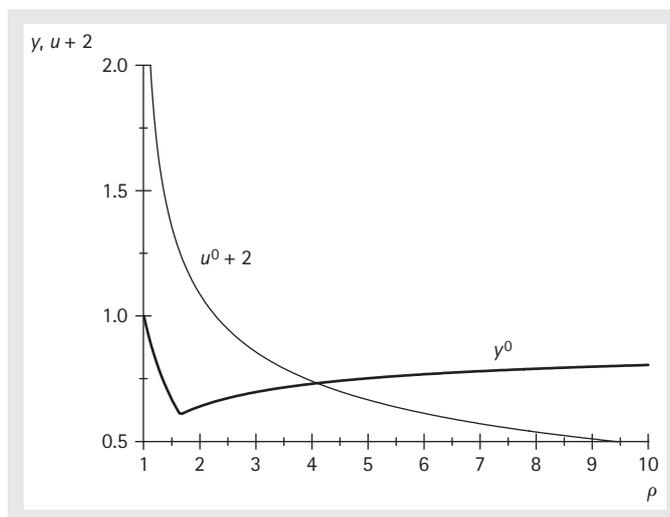


Fig. 10.1. Income (thin curve) and utility (thick curve) as a function of the riskiness ρ of the environment

riskiness, effort is worthwhile and national income is increasing in the riskiness of the environment. This non-monotonicity is illustrated in Figure 10.1.

III. FORMAL INSURANCE

Consider a large population of *ex ante* identical atomistic and selfish individuals facing i.i.d. risks of the type described above. By the law of large numbers, the fraction of individuals who end up with the low output is approximately $1 - p^0$, where p^0 is the optimal success probability (2) for each individual.

If neither individual efforts nor outputs (incomes) are verifiable, then the moral hazard problem for insurance systems is overwhelming, since the temptation will be strong for opportunistic individuals to insure themselves and then not exert any effort. A less overwhelming, but still significant, moral hazard problem pertains if individual efforts are not verifiable but outputs (incomes) are. We now analyse actuarially fair insurance in this case. Suppose that individual outputs (incomes) are verifiable while individual efforts are not. What would an optimal actuarially fair insurance give? If the individuals could collectively choose a compulsory insurance scheme—a form of social security—what would this be? What effect would insurance have on the incentive to exert effort and hence on national income?

We focus first on compulsory insurance policies. These may be provided either directly by a government agency or by perfectly competitive private insurance companies. Formally, an insurance policy is a pair $(\sigma, \pi) \in [0, 1]^2$, where the insurance premium is πy^H and the indemnity, net of the premium, to an individual who obtains the low output is σy^H . Thus, an individual who receives the high output enjoys consumption $(1 - \pi)y^H$ while an individual who receives the low output enjoys consumption $(\rho\sigma + 1)y^H/\rho$. Given such an insurance policy (σ, π) , the individually optimal effort level is the same for all individuals. The decision problem faced by each individual is equivalent to that in autarky, with the original riskiness ρ replaced by the (lower) riskiness

$$\hat{\rho} = \frac{1 - \pi}{\rho\sigma + 1} \rho. \tag{4}$$

Hence, from (2) we obtain the optimal success probability,

$$\hat{p} = \max \left\{ 0, 1 - \frac{\gamma}{\ln \hat{\rho}} \right\}. \tag{5}$$

Under insurance (σ, π) , each individual lives in a less risky environment and thus exerts less effort than in autarky. For $\gamma < \ln \hat{\rho}$ all individuals exert positive effort under the insurance policy. For $\ln \hat{\rho} < \gamma < \ln \rho$, no individual exerts any effort under the insurance policy, although all individuals would have exerted effort in autarky.

We define an insurance policy $(\sigma, \pi) \in [0, 1]^2$ to be *optimal* if it maximizes individual expected utility under the constraint that the policy is actuarially fair: $\hat{p}\pi = (1 - \hat{p})\sigma$. In order to characterize the optimal insurance policy for given values of ρ and γ , one should view the individually optimal success probability \hat{p} , defined in equation (5), as a function of the insurance policy (σ, π) and express each individual's achieved expected utility as

$$\hat{u}(\sigma, \pi) = \hat{p}(\sigma, \pi) \ln(1 - \pi) + [1 - \hat{p}(\sigma, \pi)] \ln(\sigma + 1/\rho) + \gamma \ln[1 - \hat{p}(\sigma, \pi)].$$

This defines $\hat{u} : [0, 1]^2 \rightarrow \mathbb{R}$ as a continuous function of σ and π . By Weierstrass's Maximum Theorem there exists an optimal insurance policy. It is not difficult to show that in an environment in which effort is worthwhile in autarky, insurance is welfare-enhancing:

Proposition 1. *There exists at least one optimal insurance policy $(\hat{\sigma}, \hat{\pi}) \in [0, 1]^2$. The no-insurance policy, $\sigma = \pi = 0$, is suboptimal if $\gamma < \ln \rho$.*

Until now we have assumed that insurance is compulsory. Suppose now that it is voluntary. If it is provided by the government, and each individual can choose whether or not to buy one insurance policy $(\hat{\sigma}, \hat{\pi})$, then all individuals will do so, according to Proposition 1. Suppose instead that insurance is voluntary and provided by private insurance companies. In the face of the moral hazard problem—the

non-verifiability of individuals' efforts—can the optimal policy be obtained by way of a perfectly competitive market? Assume, then, that there are risk-neutral profit-maximizing insurance companies who cannot verify individual efforts, only outputs (incomes). Assume also that insurance is indivisible, that is, individuals can buy either one or no insurance policies. If all insurance companies were to offer the optimal insurance policy $(\hat{\sigma}, \hat{\pi})$ characterized above, then it follows from Proposition 1 that each individual would buy the policy (and insurance companies would just break even). There would be no way for an individual insurance company to earn positive profits by way of offering another policy (σ, π) . In sum: if multiple or partial purchases of insurance policies are not possible, then a perfectly competitive insurance market can deliver the optimal insurance policy to a population of atomistic and selfish individuals.

While Proposition 1 establishes that each individual's achieved expected utility is higher under optimal insurance than in autarky, expected output, and hence national income, is lower:

$$\hat{y} = y^L + (y^H - y^L)\hat{p} < y^L + (y^H - y^L)p^0 = y^0.$$

Formal insurance markets tend to be well developed only in some countries. In many places individuals have little or no access to formal insurance, and are instead involved in risk-sharing arrangements at the family or the village level. We turn next to the analysis of a society where such risk-sharing is triggered by an expectation that individuals help out less fortunate family members.

IV. COERCED FAMILY ALTRUISM

Following in the tradition of Smith (1790) and Edgeworth (1881) among other economists, Sen argues that individuals are not solely driven by a wish to maximize their own material welfare. In particular, Sen identifies "sympathy" and "commitment" as two other motives: "when a person's sense of well-being is psychologically dependent on someone else's welfare, it is a case of sympathy", and "one way of defining commitment is in terms of a person choosing an act that he believes will yield a lower level of personal welfare to him than an alternative that is also available to him" (Sen 1997: 327). In this section we inject both some sympathy and some commitment into our model. Thus, assume now that individuals still work individually but belong to families, and that in case individual output levels between siblings are unequal, a rich sibling is expected to transfer resources to a poor sibling. Siblings may feel sympathy towards each other, and hence a wish to help each other, but we focus here on the case of a social norm dictating transfers

that are at least as large as the transfers that would be given voluntarily in the absence of the social norm. In other words, people may feel coerced to behave as if they were more altruistic towards other family members than they actually are. Throughout section IV we take such a social norm as given. In section IV.3 we analyse the robustness of such social norms.

More precisely, assume that each individual i has one sibling, i' , and each such pair interacts over two periods, along the lines of the model in the preceding section. Thus, in the first period, both siblings simultaneously choose their success probabilities p_i and $p_{i'}$. The output y_i of individual i is realized at the end of the first period. For the sake of notational and analytical convenience, we take the two siblings' outputs to be statistically independent random variables. This independence assumption can be relaxed to allow for positive correlation between outputs, but this does not give more insight into the incentive problems analysed here (see Alger and Weibull 2007b).

At the beginning of the second period, both siblings observe each others' outputs, and each sibling makes the socially sanctioned transfer to his or her sibling. After these transfers, each individual's *disposable income*, or *consumption*, therefore equals his output plus any transfer received from the sibling minus any transfer given to the sibling. Since only the net transfer matters for the final utility, it suffices to define the *socially sanctioned net transfer* from individual i to his or her sibling i' when the output vector is $(y_i, y_{i'})$, which we denote $\tau_i(y_i, y_{i'})$. We assume that an individual who gets a high output is expected to make a net transfer $T \in [0, 1]$ to his or her sibling should the latter's output be low. Thus, $\tau_i(y_i, y_{i'}) = T$ if $(y_i, y_{i'}) = (y^H, y^L)$, $\tau_i(y_i, y_{i'}) = -T$ if $(y_i, y_{i'}) = (y^L, y^H)$, and $\tau_i(y_i, y_{i'}) = 0$ if $y_i = y_{i'}$.

We analyse this interaction as a game, denoted G , in which a pure strategy for individual i is a success probability $p_i \in [0, 1]$. Each strategy profile determines the *total utility* to sibling i in each state $(y_i, y_{i'})$:

$$\ln(y_i - \tau_i(y_i, y_{i'})) + \alpha \ln(y_{i'} + \tau_i(y_i, y_{i'})) + \gamma \ln(1 - p_i) + \alpha \gamma \ln(1 - p_{i'}),$$

where $\alpha \geq 0$ represents the degree of *true mutual altruism* between the siblings.

We assume that the socially coerced transfer from rich to poor siblings takes the form $T = \tilde{t}y^H$, where

$$\tilde{t} = \frac{\rho \tilde{a} - 1}{\rho \tilde{a} + \rho} \quad (6)$$

and $\tilde{a} \in [1/\rho, 1]$. This form is analytically convenient, but also natural, since $\tilde{t}y^H$ is the transfer that a rich individual with true altruism \tilde{a} would choose to make voluntarily to a poor sibling (see Alger and Weibull 2007b). Hence, our assumption that the social norm dictates a transfer that is not smaller than what siblings would freely choose may be succinctly expressed as $\tilde{a} \geq \alpha$.⁶

⁶ By contrast, Alger and Weibull (2007b) assume that transfers are voluntary and driven solely by true altruism. This corresponds to the special case $\tilde{a} = \alpha$.

IV.1 Equilibrium and Comparative Statics

In the first period, each individual independently chooses a success probability. The (*ex ante*) expected total utility for individual i , which is also his or her payoff in game G , can be expressed as a function of the two success probabilities:

$$\begin{aligned}
 U_i(p_i, p_{i'}) &= (1 + \alpha) \ln y^H - (1 - p_i)(1 - p_{i'})(1 + \alpha) \ln \rho \\
 &\quad + p_i(1 - p_{i'})[\ln(1 - \tilde{t}) + \alpha \ln(1/\rho + \tilde{t})] \\
 &\quad + p_{i'}(1 - p_i)[\ln(1/\rho + \tilde{t}) + \alpha \ln(1 - \tilde{t})] \\
 &\quad + \gamma \ln(1 - p_i) + \alpha \gamma \ln(1 - p_{i'}). \tag{7}
 \end{aligned}$$

Each player has a unique best reply to the other's strategy. The following proposition characterizes the unique Nash equilibrium of G .

Proposition 2. *Suppose that the two siblings are ex ante identical, with a common degree of altruism α , and live in a society with coerced altruism $\tilde{\alpha} \geq \max\{1/\rho, \alpha\}$. Then G has a unique Nash equilibrium. This equilibrium is symmetric, with common effort zero if*

$$\ln\left(\frac{\rho + 1}{\rho + \tilde{\alpha}\rho}\right) + \alpha \ln\left(\frac{\tilde{\alpha} + \tilde{\alpha}\rho}{\tilde{\alpha} + 1}\right) + \ln \rho \leq \gamma.$$

Otherwise the common success probability \tilde{p} is the unique zero in $(0, 1)$ of

$$(1 - p - \alpha p) \ln\left(\frac{\rho + 1}{\rho + \tilde{\alpha}\rho}\right) + (\alpha - p - \alpha p) \ln\left(\frac{\tilde{\alpha} + \tilde{\alpha}\rho}{\tilde{\alpha} + 1}\right) + \ln \rho = \frac{\gamma}{1 - p}.$$

Note that, even if $\ln \rho > \gamma$ so that the autarky effort p^0 is positive, here the success probability may be nil if $\ln \rho > \gamma$. To a relatively selfish individual, the prospect of having to support a poor sibling does not give much incentive to work hard and the prospect of being helped out if poor has a disincentive effect. In fact it is not difficult to show that α , the common degree of true altruism, has a positive incentive effect on the success probability while the degree of coerced altruism, $\tilde{\alpha}$, has a negative effect:

Proposition 3. *Suppose that the two siblings are ex ante identical, are truly altruistic towards each other of degree $\alpha \in [0, 1]$, and live in a society with coerced altruism $\tilde{\alpha} \geq \alpha$, where $\rho\tilde{\alpha} > 1$. Their equilibrium success probability \tilde{p} is increasing in α and decreasing in $\tilde{\alpha}$.*

Increasing true altruism entails an *empathy effect*: the individuals take into account the utility of the other individual to a larger extent, and therefore have an incentive to increase their effort. Increasing coerced altruism entails a *free-rider effect*: an increase in $\tilde{\alpha}$ means that the individual gets to keep less should he be lucky and his sibling unlucky, and gets a larger transfer in the opposite case.

IV.2 Welfare

To make comparisons with settings where individuals are selfish we use the equilibrium-expected material utility \bar{u} as a welfare measure. Proposition 2 defines the equilibrium success probability as a function of both true altruism α and coerced altruism $\bar{\alpha}$, so we may write:

$$\begin{aligned} \bar{u}(\alpha, \bar{\alpha}) = & \ln y^H + \bar{p}(\alpha, \bar{\alpha}) [1 - \bar{p}(\alpha, \bar{\alpha})] \ln [(1 - \bar{t})(1/\rho + \bar{t})] \\ & - [1 - \bar{p}(\alpha, \bar{\alpha})]^2 \ln \rho + \gamma \ln [1 - \bar{p}(\alpha, \bar{\alpha})]. \end{aligned} \quad (8)$$

We find that \bar{u} is increasing in the common degree of true altruism, for any given degree of coerced altruism, *ceteris paribus*:

Proposition 4. *For any $\rho > 1$, $\gamma > 0$ and $\bar{\alpha} > 1/\rho$, \bar{u} is increasing in α , for $\alpha \leq \bar{\alpha}$.*

In our companion paper we analyse the special case $\bar{\alpha} = \alpha$, i.e. transfers that are driven solely by true altruism. There we show that the level of true altruism that maximizes the expected material utility is full altruism, $\alpha = 1$. Together with Proposition 4 this result implies that in our model the vector of coerced and true altruism $(\bar{\alpha}, \alpha)$ that maximizes the expected material utility involves sharing output equally, $\bar{\alpha} = 1$, and full true altruism, $\alpha = 1$.

Coerced altruism arguably exists in many parts of the world. Can such a social or cultural norm be beneficial in terms of (*ex ante*) expected material utility? In order to analyse this question in its starkest form, consider a pair of completely selfish siblings, $\alpha = 0$, who live in a society with coerced altruism of degree $\bar{\alpha} > 1/\rho$. Equation (7) gives an expression for the *ex ante* expected total utility in equilibrium. In the special case of selfish siblings, this is the same as the *ex ante* expected material utility $\bar{u}(0, \bar{\alpha})$, where $\bar{u}(0, \bar{\alpha})$ is defined in equation (8). Figure 10.2 plots this expected material utility against the level $\bar{\alpha}$ of coerced altruism, for $\rho = 5$ and $\gamma = 0.5$.

As $\bar{\alpha}$ increases beyond $1/\rho$, the smallest value of $\bar{\alpha}$ for which a positive transfer may occur, we see that the expected material utility increases. Hence, here the marginal “benefit” of coerced altruism (the imposed mutual insurance) outweighs its marginal “cost” (reduced effort). In this example, coerced family altruism is thus advantageous *ex ante*, in spite of its adverse effect on effort. This can be shown more generally: selfish siblings are better off in a society with coerced altruism than living in autarky.⁷ Moreover, the optimal level of coerced altruism does not dictate that siblings should split evenly—the rich sibling should keep more than half of the joint output:

⁷ In a similar vein, Arnott and Stiglitz (1991) show that a pair of selfish siblings who cannot observe each other’s efforts (and therefore cannot enforce transfers conditional on efforts) would nonetheless gain by agreeing *ex ante* to a contract whereby a rich sibling would make a transfer to a poor one.

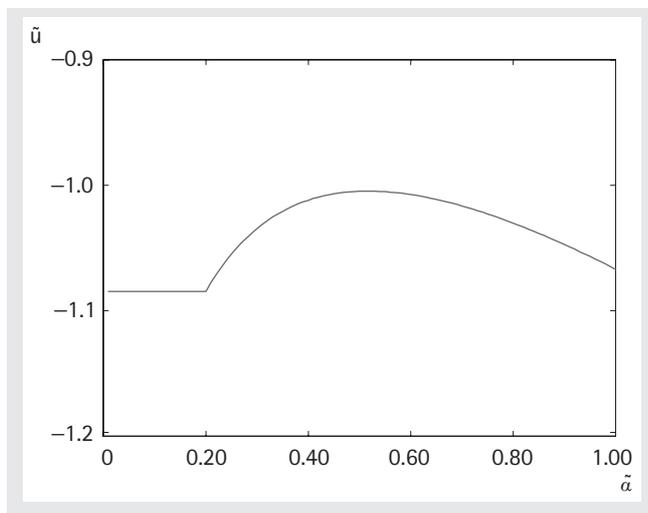


Fig. 10.2. Expected material utility $\tilde{u}(0, \tilde{\alpha})$ of selfish individuals with coerced altruism $\tilde{\alpha}$ (for $\rho = 5$ and $\gamma = 0.5$)

Proposition 5. *In a society with selfish individuals ($\alpha = 0$), the level of coerced altruism that maximizes their expected material utility exceeds $1/\rho$ and is less than 1:*

$$\frac{1}{\rho} < \arg \max_{\tilde{\alpha} \in [0, 1]} \tilde{u}(0, \tilde{\alpha}) \leq 1.$$

The intuition for the optimal $\tilde{\alpha}$ to exceed $1/\rho > 0$ is as follows. First, for $\tilde{\alpha} < 1/\rho$ no transfers are given and thus efforts are constant when $\tilde{\alpha}$ is changed. Consequently the expected material utility is also constant. At $\tilde{\alpha} = 1/\rho$, however, material utility increases when $\tilde{\alpha}$ is marginally increased. An increase in $\tilde{\alpha}$ will obviously increase the transfer between a rich and a poor sibling. Because of the concavity of the utility from consumption, this increased insurance will enhance both siblings' *ex ante* expected material utility if they would not change their efforts. Consider now the effort choice by one of the siblings, i . By the Envelope Theorem, a marginal increase in $\tilde{\alpha}$ will have no first-order effect on i 's expected utility. However, the other sibling, i' , will also change his or her effort. But it turns out that precisely at $\tilde{\alpha} = 1/\rho$, this marginal change in behavior also has no first-order effect on the expected material utility of sibling i .

While the expected utility to selfish siblings is higher under coerced altruism than without it, effort and thus the expected output \tilde{y} is lower, where

$$\tilde{y} = y^L + (y^H - y^L)\tilde{p} < y^L + (y^H - y^L)p^0.$$

IV.3 Coerced Altruism as a Robust Social Norm

Which degree of coerced family altruism will prevail as a social norm in the long run, in a population consisting of identical selfish individuals, in a given physical environment? Suppose that a certain degree of coerced altruism, \tilde{a} , is a social norm in a subset of the population, group A, while another degree of coerced altruism, \tilde{a}' , is the social norm in another subset of the population, group B. Suppose, moreover, that each group is in its corresponding equilibrium, as defined in section IV.1. Thus $\tilde{u}(0, \tilde{a})$ is the expected material utility in group A and $\tilde{u}(0, \tilde{a}')$ that in group B (see equation (8)). A situation in which $\tilde{u}(0, \tilde{a}') < \tilde{u}(0, \tilde{a})$ does not appear to be socially stable. All individuals being selfish by assumption, individuals, families and local communities in group B would be keen to adopt the social norm of group A, since that results in higher welfare. Such a change of social norms could occur either by adaptation or by migration. Given such destabilizing possibilities, we call a degree of coerced altruism \tilde{a} *socially robust* if there exists no degree of coerced altruism $\tilde{a}' \neq \tilde{a}$ such that $\tilde{u}(0, \tilde{a}') > \tilde{u}(0, \tilde{a})$. Clearly a socially robust degree of altruism, according to this definition, is an optimal degree identified in Proposition 5.

Another relevant question is the enforcement of a given degree of coerced altruism. We will not go into any depth here, making only one observation. Suppose that coerced altruism of some degree \tilde{a} is an internalized social norm in a population. Individuals who give a smaller transfer than \tilde{t} to their sibling, when that sibling is poor and they themselves are rich, experience disutility, and the more disutility the larger the fraction of the population (or their peer group) that adheres to the social norm. Formally, this amounts to a modification of the model above as follows. Consider a pair of identical siblings, both selfish. Let \tilde{p} be the equilibrium success probability (defined in Proposition 2) and let $z \in [0, 1]$ be the share of the population who adhere to the norm by way of giving a transfer $t \geq \tilde{t}$ when rich and their sibling is poor (where \tilde{t} is defined in equation (6)). Let $\varphi(z)$ be the disutility experienced by an individual who deviates from this norm, where φ is an increasing function with $\varphi(0) = 0$ and $\varphi(1) = \lambda > 0$. Since by assumption all individuals are selfish, a deviator will not give any transfer to his or her sibling. Hence, a deviator will make an effort such that the success probability p solves

$$\begin{aligned} \max_{p \in [0,1]} \ln y^H - (1-p)(1-\tilde{p}) \ln \rho - p(1-\tilde{p})\varphi(z) \\ + (1-p)\tilde{p} \ln(1/\rho + \tilde{t}) + \gamma \ln(1-p). \end{aligned} \tag{9}$$

Let p^d be the (generically unique) solution to this program.

In this generalized model of coerced altruism among identical selfish individuals, coerced altruism of degree \tilde{a} will thus prevail as a social norm, $z = 1$, if and only if

$$\begin{aligned} \lambda p^d(1-\tilde{p}) + \tilde{p}(1-\tilde{p}) \ln [(1-\tilde{t})(1/\rho + \tilde{t})] - (1-\tilde{p})^2 \ln \rho + \gamma \ln(1-\tilde{p}) \\ \geq -(1-p^d)(1-\tilde{p}) \ln \rho + (1-p^d)\tilde{p} \ln(1/\rho + \tilde{t}) + \gamma \ln(1-p^d). \end{aligned} \tag{10}$$

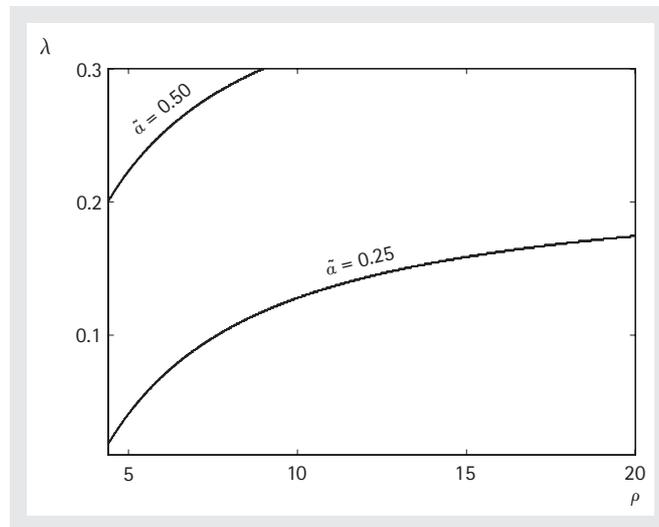


Fig. 10.3. Sustainability of coerced altruism as a social norm, as a function of ρ and λ

We also note that, viewed as a game with a continuum of players, there may exist multiple equilibria for certain parameter combinations; it is possible that both $z = 1$ and $z = 0$ are equilibria.⁸ In the first equilibrium, all individuals adhere to the social norm of coerced altruism of degree $\tilde{\alpha}$ while in the second equilibrium nobody gives any transfer (and experiences no disutility from doing so, since everybody deviates).

Is coerced altruism easier to sustain as a social norm in a harsher climate? We can illustrate this by studying the range of λ -values for which the adherence condition (10) is met, as a function of ρ . Thus, in Figure 10.3 the lower curve shows the lowest value λ , of the cost inflicted on deviators, for which coerced altruism $\tilde{\alpha} = 0.25$ may be sustained as a social norm (for $\gamma = 0.5$). As expected, the temptation to deviate from the norm is larger for larger values of ρ : the threshold value increases as ρ increases. The upper curve in the figure further shows that, as expected, for any ρ a larger punishment would be required to sustain a higher level of coerced altruism, $\tilde{\alpha} = 0.5$ (see the upper curve).

In brief, our analysis shows that informal insurance by way of coerced altruism is beneficial, and that it may arise as a social norm. However, intuition would suggest that formal insurance institutions, which pool the risks of large numbers of individuals, would be even better. It is indeed easy to establish that selfish individuals would rather live in a society where they have access to formal insurance than in one with coerced altruism, even if coerced altruism is at its optimal level:

⁸ Indeed, there may also exist a whole continuum of intermediate equilibria where the share of population z is such that all individuals are indifferent between adhering to the norm or deviating from it.

Proposition 6. *For selfish individuals, the expected material utility under coerced family altruism is lower than under optimal compulsory insurance.*

However, this does not answer the question whether coerced altruism, if coupled with some true altruism, would also be dominated by formal insurance. We analyse this question next. In particular, we analyse incentives for people to migrate from developing to developed countries, and compare the welfare of immigrants to that of the local population.

V. FORMAL INSURANCE VERSUS COERCED ALTRUISM

For the purposes of this thought experiment we assume that coerced altruism is non-binding, i.e. $\alpha = \tilde{\alpha}$, and we will refer to α as the strength of family ties. By virtue of Proposition 4 this assumption gives informal insurance the best possible chance against formal insurance.

Consider a pair of siblings living in some country, A, where no formal insurance exists, but where family ties are very strong, $\alpha_A = 1$. Assuming that this sibling pair would keep its strong family ties if it were to move to another country. Would it have an incentive to migrate to country B, where family ties are weak, $\alpha_B = 0$, and where an optimal compulsory insurance system (for the inhabitants of B) is in place? If so, how would this pair of siblings fare compared to the original inhabitants of country B, in terms of material utility and income? Let (y_A^H, ρ_A) and (y_B^H, ρ_B) denote the sibling pair's environment in countries A and B, respectively. An incentive for the sibling pair to migrate would obviously exist if $y_B^H > y_A^H$ and $\rho_A < \rho_B$; then the expected material utility, and hence also total (altruistic) utility, would be higher in country B. Consider, therefore, a situation in which the siblings' incomes, when successful, are the same in both countries, $y_A^H = y_B^H = 1$, but the riskiness may differ (and country B has an insurance scheme).

In country B the compulsory insurance policy $(\hat{\sigma}_B, \hat{\pi}_B)$ entails an income riskiness, $\hat{\rho}_B$, derived from the triplet $(\rho_B, \hat{\sigma}_B, \hat{\pi}_B)$ according to equation (4). If the pair of siblings moved from country A to country B, they would represent a negligible part of the population there, and would therefore have no effect on the optimal insurance contract. They may therefore view the income riskiness $\hat{\rho}_B$ in country B as fixed and given. Since the optimal insurance policy $(\hat{\sigma}_B, \hat{\pi}_B)$ is second best, $\hat{\rho}_B > 1 = \alpha_A$, a successful immigrant sibling (the one obtaining the high output) would make a transfer to his or her unsuccessful sibling (the one obtaining the low output) even in country B. As long as $\hat{\rho}_B \leq \rho_A$, the siblings would be as well off as

in their country of origin. In fact, the next proposition implies that if this inequality is strict, they would be strictly better off in the new country, both in terms of their material utility, and in terms of their total (altruistic) utility.

Proposition 7. *Consider game G played by two fully altruistic siblings. In equilibrium, their expected material utility is strictly decreasing in ρ , ceteris paribus.*

Thus, under our hypothesis $y_A^H = y_B^H$, the sibling pair would want to migrate if, and only if, the income riskiness in country B, $\hat{\rho}_B$, is lower than that in country A, ρ_A .

Assuming that the cost of achieving a particular success probability is the same for everyone, $\gamma_A = \gamma_B$. Would the immigrant sibling pair make a higher or a lower effort than the locals? The only difference between the immigrants and the locals is the strength of their family ties: $\alpha_A = 1 > 0 = \alpha_B$. From the above analysis we know that individuals in altruistic families may make a higher or a lower effort than selfish individuals, depending on the environment. Thus, the immigrants may get a higher or lower expected income than the locals. In any event, the immigrants enjoy a higher expected material utility than the locals.

Until now we have assumed that insurance is compulsory in country B. Suppose instead that it is voluntary, and that the immigrant sibling pair does not purchase any insurance policy. If $y_A^H = y_B^H$, Proposition 7 implies that the sibling pair would have an incentive to migrate if, and only if, $\rho_B \leq \rho_A$. Should this condition hold and the sibling pair migrate, would they necessarily be worse off than the locals, in terms of their expected material utility, by relying solely on each other's altruism rather than on the formal insurance available in country B? Surprisingly, the answer is no.

A limitation of intra-family transfers is the absence of transfers of resources from states of nature in which all family members are well off to states in which they all are poor. By contrast, an insurance market that pools the resources of a large number of individuals exposed to idiosyncratic risks enables transfers to a poor individual even when his or her sibling is also poor. However, market insurance has a disincentive effect on effort, and typically insurance companies cannot monitor effort while in many cases family members can. The question that we address here is whether this disincentive effect can be stronger than that caused by true altruism. We illustrate the relevant trade-offs between insurance and incentives in the model outlined above by comparing the expected *material* utility under optimal formal insurance with that under intra-family transfers in a few numerical examples.⁹

⁹ In fact, while we put family ties at a disadvantage by assuming the smallest possible number of family members, we put it to an advantage by assuming uncorrelated risks across family members. Families that live close together and undertake identical production tasks will face positively correlated risks and hence more rarely end up with asymmetric outcomes.

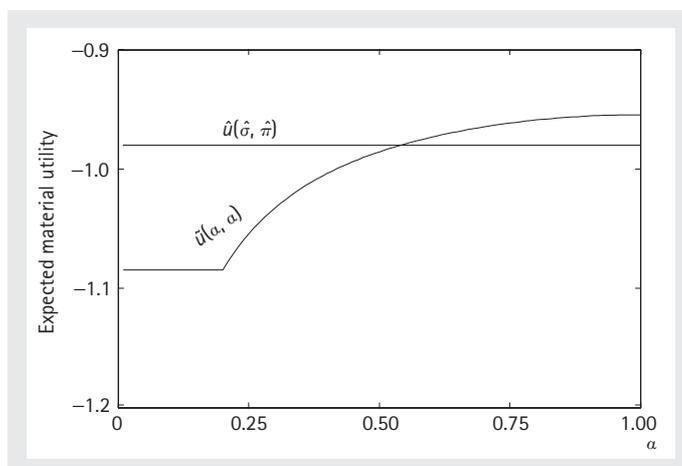


Fig. 10.4. Expected material utility under optimal insurance $\hat{u}(\hat{\sigma}, \hat{\pi})$ (horizontal line) and under true family altruism $\tilde{u}(\alpha, \alpha)$ (curve)

Consider first the case of $\rho_B = 5$ and $\gamma_A = \gamma_B = 0.5$. From section II.2, we obtain (by way of Matlab) the optimal insurance coverage $\hat{\sigma} \simeq 0.126$. This implies an equilibrium success probability of $\hat{p} \simeq 0.489$ and an expected material utility of about -0.98 .¹⁰ The horizontal line in Figure 10.4 represents this material utility level, while the curve is the graph of the expected material utility to an altruistic sibling without insurance, as a function of the common degree of altruism α . This example shows that in a society with well-functioning insurance markets, individuals with strong altruistic family ties who do not buy insurance, such as our immigrant siblings, may obtain higher expected material utility than selfish individuals who buy formal insurance, such as the natives of country B.

However, if the riskiness of the environment is sufficiently high, then formal insurance yields a higher expected material utility than fully altruistic family ties, for all degrees of altruism. With ρ on the horizontal axis and γ on the vertical, Figure 10.5 (generated with Matlab) illustrates how our fully altruistic immigrant siblings fare in comparison with the optimally insured selfish natives. In the parameter region below the curve, the siblings fare better, in terms of expected material utility, than the natives.¹¹

¹⁰ As is well known, in this type of model non-convexities in preferences over insurance policies may arise when the effect of the insurance on the effort is taken into account (see Arnott and Stiglitz 1988). However, in our examples the maximization problem is well behaved.

¹¹ Note that the condition $\gamma < \ln \rho$, presumed in our analysis, is met by all points in the figure.

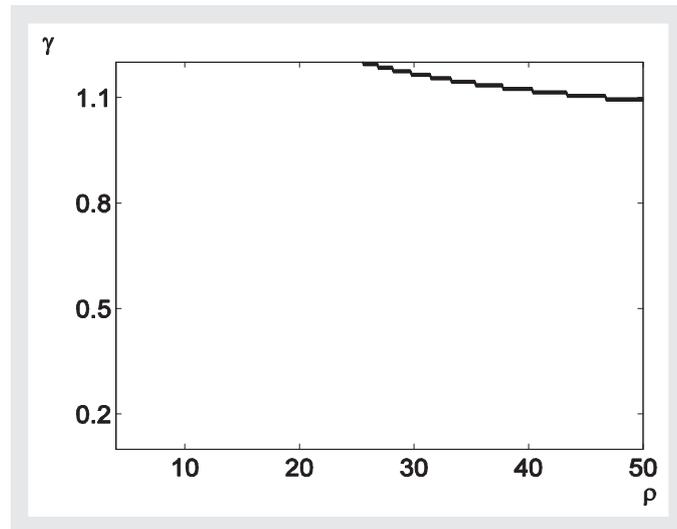


Fig. 10.5. Optimal informal insurance, $\tilde{\alpha} = \alpha = 1$, outperforms optimal formal insurance $(\hat{\sigma}, \hat{\pi})$ for values of (ρ, γ) below the curve

VI. CONCLUSION

Evidence indicates that family ties are stronger in some parts of the world than in others, and that this may have been so for several centuries. This observation prompted us to ask how the strength of family ties affects economic outcomes. Focusing on the family's potentially important role as an insurance provider for its members, we conducted a theoretical investigation of several questions, including how the strength of family ties affects economic outcomes such as the choice of a risk-reducing effort, and whether insurance provided within the family may be a good substitute for market insurance. To address these questions we proposed a simple model of individuals in an environment with uncertain outputs, where individuals may reduce the risk at some cost, and where families consist of pairs of identical individuals (which we may think of as grown-up siblings). In our model, insurance within a family took the form of transfers between the two family members, and although we allowed for siblings to be altruistic towards each other, we assumed that the transfers between them were dictated by social norms (coerced altruism). A parameter (ρ) captured the riskiness of the environment (the ratio between the highest and the lowest possible output).

We found that whereas coerced altruism entails a free-rider effect and thus decreases the level of risk-reducing effort, true altruism mitigates this free-rider effect by way of an empathy effect. An altruistic individual has an incentive to increase his or her risk-reducing effort for two reasons: first, to increase the probability of being

able to help a poor sibling, and second, to decrease the probability of being unlucky and forcing the sibling to help him or her out. Furthermore we showed that even if individuals are selfish, so that only the free-rider effect is present, coerced altruism is beneficial from an *ex ante* perspective, although it gives rise to involuntary transfers *ex post*.

Finally, we found that if both coerced altruism and true altruism are sufficiently strong, an individual who has access to insurance only by way of coerced altruism within the family may be better off than an individual who only has access to formal insurance. Moreover, this tends to be true if the underlying riskiness is low. If riskiness is low, selfish individuals have a low incentive to exert a risk-reducing effort even without insurance, and the moral hazard implied by formal insurance then implies that an insurance market can only play a very minor role, despite its ability to pool the resources of a very large number of individuals. By contrast, strong coerced altruism coupled with strong true altruism means that individuals have an additional incentive to exert a risk-reducing effort, namely, the utility that an altruistic individual derives from helping out the other. Where riskiness is low this empathy effect of altruism implies that individuals undertake a higher risk-reducing effort than if they were living in autarky. Thus, if individuals are rewarded for sharing with others (in our model this reward comes in the form of altruism, but society may also provide rewards), a high level of resource-sharing within the family does not necessarily imply moral hazard: indeed, *moral protection* may arise instead, whereby stronger family ties may lead individuals to choose a higher effort. Compared to market insurance, the benefit of moral protection may outweigh the cost associated with the family's inability to share the resources of a very large number of individuals.

To keep our analysis simple, we modeled a family as a pair of *ex ante* identical individuals. It would be desirable and interesting to see whether our results extend to a richer model, with larger families and heterogeneous individuals. It may also be fruitful to apply some of the concepts of our model to other settings, in particular to credit markets. In many developing countries, as well as in developed ones, we are seeing microfinance systems emerge, such as the Grameen Bank in Bangladesh (for a survey, see Armendáriz and Morduch 2005). In some of these programs poor individuals take bank loans backed by their relatives and neighbors: if a loan-taker defaults, a whole group of individuals are liable. Allowing for altruistically motivated individuals may provide additional insights into some of the successes of microfinance programs.

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