Concluding Remarks

We study voluntary reciprocity as an informal social insurance mechanism where rational agents smooth their consumption by paying and receiving a transfer voluntarily. The voluntary feature of the mechanism is expressed in the following elements: the participants do not rely on a binding contract, their current income state matters, and an agreement can be renegotiated and even annulled unilaterally. We investigate three topics: first, the necessary conditions for voluntary reciprocal transfer payments to exist; second, the sustainable agreement of the mechanism; and third, the effect of the occurrence of both idiosyncratic and common risks on the likelihood of voluntary reciprocity to exist.

We model voluntary reciprocity as an infinite repetition of a two-person game under the assumptions that the players have complete information and that they are identical except in the income they receive. In a steady environment (i.e., the stochastic process is assumed to follow a Markov Chain process with stationary transition intensities), the players decide the amount of transfer to be paid and received after income uncertainty is revealed.

As shown in Chapter 2, co-operation can exist if, given a player's level of relative risk aversion and rate of time preference, the low income state is sufficiently severe for the player who has to pay. This implies that voluntary reciprocity is more likely to exist the lower the rate of time preference, the higher the level of relative risk aversion, the larger the income difference, and the higher the hazard rate out of the low income state. When the risk averse players are willing to pay a higher transfer the more severe the low income state, a higher income level is conducive for co-operation.

Given that the low income state is sufficiently severe, the existence of co-operation also requires that the transfer which has to be paid and received by the participants does not give those who have to pay a lower payoff than the payoff they can obtain from not participating. In Chapter 3 we apply a bargaining game to show the sustainable agreement among all of the feasible transfers. In a game with endogenously determined bargaining states, the transfer which maximises the payoff of the player who has to pay is sustainable. Thus, when current income state matters and an agreement can be renegotiated and annulled unilaterally, the agreement is in favour of the player who has to pay. Furthermore, we show that the sustainable equilibrium is reached after some delay if the bargaining process has low friction.

The occurrence of both idiosyncratic and common risks, as shown in Chapter 4, does not prevent voluntary reciprocity to exist. However, co-operation requires a condition which is harder to fulfil. The transfer which maximises the payoff of the player who has to pay in the prevailing common income state is always feasible. Nevertheless, when the common income state changes and the

player who has to pay is not allowed to adjust the amount of transfer he has to pay, then co-operation may break down.

We would like to highlight three new results from our model on consumption smoothing by means of reciprocal transfer payments. First, contrary to the prediction of Kimball (1988) and Coate and Ravallion (1993), our model predicts that, given the relative risk aversion and the rate of time preference of the players, the mechanism can exist only if the income difference is sufficiently large. The larger the income difference, the bigger the income loss that one may have to bear, and therefore the higher the gain that can be obtained from participating.

Second, we assert that the current income state is crucial in determining the feasibility of co-operation and the level of transfer which will be agreed upon. According to our model, voluntary co-operation will not yield full insurance even when there are no informational problems. When the current income state matters, players can not be identical unless they receive the same level of income. When players receive different income levels, then they will attach different weights to the utility from each possible income state in their expected lifetime utilities, even when the probability to leave an income state is the same for every player and every income state.

Third, common income risk does not prevent the system from reallocating income. However, the voluntary feature of the co-operation requires that the player who has to pay is allowed to adjust the level of the transfer to be paid according to the prevailing situation.

Note however, that in our model reciprocal transfer payments is *the only* means for consumption smoothing. As has been suggested also by Coate and Ravallion (1993), savings should be an available option for consumption smoothing. When savings is an option for consumption smoothing, the stochastic process can not be assumed to be a Markov Chain. Current strategies will have to depend on the past realisation of the stochastic process which enable wealth accumulation. The level of wealth will then be used as another criterion to classify participants. I hypothesise that co-operation can exist only among participants with more or less the same level of wealth. A rich player may have no interest in helping a poor player when the probability to be poor (or to be rich) is too small. However, co-operation among players with more or less the same level of wealth will be more difficult because the return (and costs) from saving might be higher (lower) than the return (costs) from participating in reciprocal transfer payments.

Note further that our model does not consider effort level at all. We can incorporate this into the model by making the hazard rate dependent upon a player's effort level. This way, the model can also take into account moral hazard problems[1]. Each player will have a subjective hazard rate which will determine the subjective severity of the low income state. I suggest that co-operation will be more difficult the more important the role of effort on the probability to leave an income state. When players with high income have a very low probability to leave the high income state and a very high probability to leave the low income state, then the low income state is less severe. This will impede co-operation. However, once co-

[1] The need to incorporate moral hazard is also mentioned by Coate and Ravallion (1993). Their prediction is similar to ours.

operation exists, I surmise that the transfer which maximises the payoff of the player who has to pay will be the sustainable equilibrium.

Our model can be used to predict the effect of policies which reduce the severity of the low income state. I suggest that policies which lessen the chance to leave the low income state will discourage voluntary reciprocal transfer payments. However, this hypothesis is based on the assumption that the stationarity of the environment can be maintained. Note though that the importance of the mechanism matters in so far as there is no better way for households to smooth their consumption.

Our simple model can be generalised by dropping the assumption that all players have identical preferences and that there are only two idiosyncratic income states. Without these assumptions, the game turns into an n-person game and each player may be in a different income state. I expect that the model will predict the same result as long as the stationarity of the stochastic process remains.

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