Joint Liability Borrowing and Suicide*

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Abstract

This paper shows that joint liability borrowing may put too much pressure on the borrower, mainly through the stigma in case of repayment failure, and leads to a vexing outcome—the suicide of the borrower. We provide a model of joint liability borrowing which facilitates credit market transaction *ex ante* but may induce suicides *ex post* in the bad state. We introduce some supportive evidence from a suicide survey in Japan.

Keywords: Joint Liability; Suicide; Stigma

JEL classification: G21; I30; J17

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1 Introduction

In Japan, co-guarantor system is common in people's daily life. In particular, for small and medium borrowing without collateral, co-guarantor contract is a standard practice used by creditors and borrowers to facilitate credit market transactions. Under this contract, a borrower is required to find a co-guarantor, usually a close family member or a very close friend, who is jointly liable to the full extent of the amount of his debt. This Japanese co-guarantor system or joint liability contract has similar features as the micro-credit program initiated by Dr. Muhammed Yunus of the Grameen Bank.

The "group-lending" contract in micro-credit programs effectively makes the peers of a borrower as co-guarantors of his loan (Armendáriz de Aghion and Morduch, 2005). This joint liability arrangement mitigates adverse selection and moral hazard in credit markets through the peer screening and monitoring mechanisms, respectively (Ghatak, 1999; Stiglitz, 1990). Furthermore, it weakens incentives of strategic defaults through informal enforcement mechanism or the social collateral as named by Besley and Coate (1995).[1]

However, this study points out that, in cases when the borrower fails to repay his debt, this informal enforcement mechanism may put too much pressure on the borrower through the "stigma" or "social penalty" as in Besley and Coate (1995), leading to a vexing outcome—the suicide of the borrower. The link between strong stigma and suicides has also been documented in others fields. Besley (p.2179, 1995) cited anthropologist Ardener's (1964) observation that the stigma through social sanction may result in suicides of those who failed in installments in rotation savings and credit associations (ROSCAs). West (2003) also pointed out that many people in Japan seem to believe that killing oneself creates less of a burden to the family members than having them live with a debtor.

This study provides a model of joint liability borrowing which facilitates credit market

[1]Yet, recently, a couple of new studies emerged which challenge the validity of effective enforcement mechanisms of the joint liability lending [Che (2002); Kono (2006)].

transaction *ex ante* but may induce suicides *ex post* in the bad state due to stigma. Some supportive evidence from a suicide survey is also presented.

2 The Model

Consider a two-stage framework where an individual makes decision on whether to engage in joint liability borrowing of a fixed amount L from some creditor in stage one, and depending on the realization of the income, the individual makes decision on whether to end his life in stage two. There are two states of nature in stage two: with probability p, it is a "good" state (G), and the incomes of the borrower (D) and co-guarantor (C) are I_G^D and I_G^C respectively; with probability $1-p$, it is a "bad" state (B), and the incomes of the borrower and co-guarantor are I_B^D and I_B^C respectively. Let $I_G^i > I_B^i \; \forall \; i \in \{D, C\}$.

Regardless of the state of nature, borrowing results in a net benefit of $\delta L > 0$. It is assumed that, in the good state, $I_G^D + \delta L > 0$ so that the borrower can pay off his debt. There is no strategic default; the borrower always pays off the debt whenever possible. Nonetheless, in the bad state, $I_B^D + \delta L < 0$, the individual cannot pay off the loan, and the co-guarantor is responsible for the remaining debt. Note that the co-guarantor acts passively whenever called upon to sign.

A borrower's utility function is represented by $U(\cdot, V(\cdot))$, where $V(\cdot)$ is the utility of the co-guarantor. This setup assumes that a borrower concerns the welfare of his co-guarantor, therefore, making the co-guarantor repay his debt reduces not only the utility of the co-guarantor but also that of the borrower. Let b be a random variable representing the individual's "taste" for suicide. Following Hamermesh and Soss (1974), an individual makes suicide decisions when the utility level, $U(\cdot, V(\cdot)) < b$.

Borrowing and Suicide Decisions

Whether to engage in joint liability borrowing depends on the comparison of the expected utility of borrowing versus not. An individual borrows when:

$$\begin{aligned} & pU\left(I_G^D+\delta L, V(I_G^C)\right)+(1-p)\max\left\{U(\pi(I_B^D+\delta L), V(I_B^C+I_B^D+\delta L)), b\right\} \\ > \; & pU(I_G^D, V(I_G^C))+(1-p)\max\left\{U\left(I_B^D, V(I_B^C)\right), b\right\}, \end{aligned}$$

or,

$$\begin{aligned} & \frac{p}{1-p}\left[U\left(I_G^D+\delta L, V(I_G^C)\right)-U(I_G^D, V(I_G^C))\right] \\ & +\left[\max\left\{U(\pi(I_B^D+\delta L), V(I_B^C+I_B^D+\delta L)), b\right\}-\max\left\{U\left(I_B^D, V(I_B^C)\right), b\right\}\right]>0. \end{aligned}$$

Note that an individual, borrowing or not, does not consider suicide an option in the good state, and will never commit suicide *ex ante*; i.e., before the realization of the state of nature. In the bad state, the realized income of a borrower is negative, $I_B^D+\delta L<0$. The co-guarantor is then responsible for this financial gap and his net income becomes $I_B^C+I_B^D+\delta L$. The borrower is left with a money-measured "stigma", $\pi(I_B^D+\delta L)\leq 0$, which is an increasing function of the financial gap. As the financial gap gets wider, i.e., $I_B^D+\delta L$ becomes more negative, the magnitude of the stigma gets larger.

Depending the results of the maximum operations, there are four cases:

- Case *SS*: $\max\left\{U(\pi(I_B^D+\delta L), V(I_B^C+I_B^D+\delta L)), b\right\}=\max$ $\left\{U\left(I_B^D, V(I_B^C)\right), b\right\}=b$
- Case *NS*: $\max\left\{U(\pi(I_B^D+\delta L), V(I_B^C+I_B^D+\delta L)), b\right\}=U(\pi(I_B^D+\delta L), V(I_B^C+I_B^D+\delta L))$, and $\max\left\{U\left(I_B^D, V(I_B^C)\right), b\right\}=b$.
- Case *SN*: $\max\left\{U(\pi(I_B^D+\delta L), V(I_B^C+I_B^D+\delta L)), b\right\}=b$, and $\max\left\{U\left(I_B^D, V(I_B^C)\right), b\right\}=U\left(I_B^D, V(I_B^C)\right)$.

- Case NN: $\max\left\{U(\pi(I_B^D+\delta L), V(I_B^C+I_B^D+\delta L)), b\right\} = U(\pi(I_B^D+\delta L), V(I_B^C+I_B^D+\delta L))$, and $\max\left\{U\left(I_B^D, V(I_B^C)\right), b\right\} = U\left(I_B^D, V(I_B^C)\right)$.

Consider the suicide decision of an individual who borrows (a borrower) in the first stage and the state of nature is bad. Based on the threshold decision rule, an individual commits suicide in Cases *SS* and *SN*, but not in Cases *NS* and *NN*.

Among the not committing suicide cases, Case *NN* is trivial in that a borrower lives with the stigma, and would not commit suicide even if he had not borrowed in the first stage. However, in Case *NS*, a borrower lives with stigma, and would not commit suicide if he had not borrowed in the first stage. Hence, in Case *NS*, joint liability borrowing reduces suicide.

Among the committing suicide cases, Case *SS* is trivial in that a borrower would kill himself even if he had not borrowed in the first stage. However, in Case *SN*, a borrower commits suicide and he would not choose to do so if he had not borrowed in the first stage. The borrower in Case *SN* chooses to end his life because of the stigma of having the co-guarantor to take the responsibility of his financial gap, and because of the utility lost that he incurs upon the co-guarantor. Hence, in Case *SN*, joint liability borrowing increases suicide.

In order to grasp an intuition behind Case *SN*, suppose a risk-neutral linear utility function. When the state of nature is bad, we postulate that $U(\pi(I_B^D+\delta L), V(I_B^C+I_B^D+\delta L)) = \alpha_\pi(I_B^D+\delta L)+\alpha_V(I_B^C+I_B^D+\delta L)$ and $U(I_B^D, V(I_B^C)) = \alpha_\pi I_B^D + \alpha_V I_B^C$. Note that non-negative parameters, α_π and α_V, represent the degrees of social stigma and altruism, respectively. It is straightforward to show that when $\alpha_\pi + \alpha_V > 1$, i.e., when social stigma and/or altruism are sufficiently strong, there exists $p \in [(I_B^D + \alpha_V I_B^C - b)/(I_B^D + \delta + \alpha_V I_B^C + \alpha_V I_G^C - b), 1]$ such that an individual borrows but commits suicide in the realization of the bad state.[2]

Joint liability borrowing has effects on suicides in Cases *NS* and *SN*, but not in the other two cases. Whether a real world situation is Case *NS* or Case *SN* depends on

[2]Case *NS* arises when $\alpha_\pi + \alpha_V < 1$.

the magnitude of the stigma and the degree of altruism. In countries such as Japan and South Korea where the degree of family and/or social connectedness is high, we conjecture that the magnitude of stigma and the degree of altruism are both high, and Case *SN* describes such a scenario properly. For suicide prevention, Case *SN* is the target. Helping borrowers that are financially constrained is the essential task of suicide prevention.

3 Suicide Survey

In 1998, the total number of suicides in Japan jumped by 34.7%, from 24,391 in the previous year to 32,863. In particular, the number of suicides of self-employed increased by 43.8%. The Cabinet Office (2007) and Watanabe et al. (2006) have identified the credit crunch happened in 1997 as one of the main causes of the dramatic increase in the number of suicides of the self-employed.[3] In the case that self-employed people depends more on borrowing under co-guarantor contracts, this study provides an explanation of how a credit crunch may lead to a sharp increase in the number of suicides of the self-employed. A recent survey provides some supporting evidence of this interpretation.

Lifelink, a Tokyo-based non-for-profit organization, and the authors are conducting a survey on bereaved families of suicide victims. A 101 people pilot survey with detailed questions has been completed in September, 2007.[4]

One result related to this study is that a larger fraction of self-employed people commits suicide, possibly due to the joint liability contract. 45.5% of self-employed (10 out of 22) committed suicide because of multiple debt and/or the co-guarantor problem, as opposed to 12.7% of the non-self-employed (10 out of 79). About a third of the self-employed suicides (7 out of 22) was due to the co-guarantor problem, as opposed to only

[3]According to Woo (2003), the collapse of mega-banks in 1997 caused a crisis in the domestic financial sector which is often referred to as a typical example of "credit crunch".

[4]The on-going nationwide survey plans to collect data from the bereaved family members of 1,000 suicide victims. For detail information of this survey, please refer to the homepage of *Lifelink*, `http://www.lifelink.or.jp/`.

6% of the non-self-employed suicides (5 out of 79).

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