# Bank Finance versus Bond Finance.

# Appendix (not for publication)

Fiorella De Fiore* Harald Uhlig†

European Central Bank University of Chicago and CEPR

September 26, 2011

## 1 Proofs

### 1.1 Proposition 1

Conditions (7) and (15) imply that the expected profits of entrepreneurs willing to produce are not lower than the utility from disposing of the net worth initially invested. Notice that the problem is linear in $\widehat{n}_{it}$. Thus, the solution is such that the entrepreneur either invest nothing and does not produce, $\widehat{n}_{it} = 0$, or invest everything and produce, $\widehat{n}_{it} = \tilde{n}_{it}$. Entrepreneurs that produce only raise costly external finance to cover what is needed in excess of the internal funds, $x_{it} - \tilde{n}_{it} = (\xi - 1)\tilde{n}_{it}$. To realize that equation (16) delivers a unique interior solution to the CSV problem, notice that $f(0) = 1$, $g(0) = 0$, $f'(\overline{\omega}^j_{it}) = \Phi_\omega\left(\overline{\omega}^j_{it}\right) - 1 < 0$, and $g'(\overline{\omega}^j_{it}) > 0$. This latter property can be shown by contradiction. Suppose $g'\left(\overline{\omega}^j_{it}\right) < 0$. Then, it would be possible to increase expected profits of the firm, $s_{it} f(\overline{\omega}^j_{it})\xi\tilde{n}_{it}$, by reducing $\overline{\omega}^j_{it}$ while increasing expected profits of the FI, $s_{it} g(\overline{\omega}^j_{it})\xi\tilde{n}_{it}$. Hence, $\overline{\omega}^j_{it}$ could not be a solution to the contract. It follows that the unique interior solution to the problem is given by (16).

### 1.2 Proposition 2

An entrepreneur that, upon payment of the information acquisition fee $\tau n_{it}$, observes $\varepsilon_{1,it}$ and $\varepsilon_{2,it}$, proceeds with the bank loan if and only if his expected profits exceeds the opportunity

*Directorate General Research, European Central Bank, Postfach 160319, D-60066 Frankfurt am Main. Ph: +49-69-13446330. fiorella.de_fiore@ecb.int.

†Dept. of Economics, 1126 East 59th Street, Chicago, IL 60637. Ph: +1-773-702-8191. huhlig@uchicago.edu.

costs of renting his capital to others, i.e. if $s_{it}f(\overline{\omega}^b(s_{it}))\xi \geq 1$, where $s_{it} = \varepsilon_{1,it}\varepsilon_{2,it}q_t$. Notice that expected profits from proceeding with the bank are zero for $s_{it} = 0$ and strictly increasing in $s_{it}$, since $f'\left(\overline{\omega}^b_{it}\right) < 0$ and $\frac{\partial \overline{\omega}^b_{it}}{\partial s_{it}} < 0$. Hence, a solution to condition (17) exists and is unique. Moreover, it is constant across firms and time.

### 1.3 Proposition 3

Notice that $F^b(0) = 1 - \tau > F^c(0)$. Under (A1), there is a unique cutoff point $s_b$, which satisfies the condition $F^b(s) = 1$. A sufficient condition for existence and uniqueness of $s_c$ is provided by $(A1)$ and $(A2)$. Both thresholds are constant across firms and time. ■

## 2 Aggregation

Define $\psi_x(q_t) \equiv \psi_x^c(q_t) + \psi_x^b(q_t)$, where

$$\begin{aligned}\psi_x^b(q_t) &\equiv \int_{\frac{s_b}{q_t}}^{\frac{s_c}{q_t}} \int_{\frac{s_d}{\varepsilon_1 q_t}} (1-\tau)\Phi_2(d\varepsilon_2)\Phi_1(d\varepsilon_1) \\ \psi_x^c(q_t) &\equiv \int_{\frac{s_c}{q_t}} \Phi_1(d\varepsilon_1),\end{aligned}$$

and

$$\begin{aligned}\psi_y(q_t) &\equiv \int_{\frac{s_b}{q_t}}^{\frac{s_c}{q_t}} \int_{\frac{s_d}{\varepsilon_1 q_t}} (1-\tau)\varepsilon_1\varepsilon_2\Phi_2(d\varepsilon_2)\Phi_1(d\varepsilon_1) + \int_{\frac{s_c}{q_t}} \varepsilon_1\Phi_1(d\varepsilon_1) \\ \psi_m(q_t) &\equiv (1-\tau)\int_{\frac{s_b}{q_t}}^{\frac{s_c}{q_t}} \int_{\frac{s_d}{\varepsilon_1 q_t}} \varepsilon_1\varepsilon_2 \int^{\overline{\omega}^b(\varepsilon_1\varepsilon_2 q_t)} \varepsilon_3\Phi_3(d\varepsilon_3)\Phi_2(d\varepsilon_2)\Phi_1(d\varepsilon_1) \\ &\quad + \int_{\frac{s_c}{q_t}} \varepsilon_1 \int^{\overline{\omega}^c(\varepsilon_1 q_t)} \varepsilon_2 * \varepsilon_3\Phi_{2*3}(d(\varepsilon_2 * \varepsilon_3))\Phi_1(d\varepsilon_1) \\ \psi_\tau(q_t) &\equiv \tau\int_{\frac{s_b}{q_t}}^{\frac{s_c}{q_t}} \Phi_1(d\varepsilon_1),\end{aligned}$$

where $\Phi_{2*3}$ denotes the distribution function for the product $\omega = \varepsilon_2\varepsilon_3$.

Now let $\vartheta_b(\varepsilon_1, q_t; s_d)$ be the average profits per unit of net worth of the bank-financed entrepreneurs, given $\varepsilon_1$, aggregate information $q_t$, and the threshold $s_d$ :

$$\vartheta_b(\varepsilon_1, q_t; s_d) = (1-\tau)\left[\int_{\frac{s_d}{\varepsilon_1 q_t}} \varepsilon_1\varepsilon_2 q_t f\left(\overline{\omega}^b(\varepsilon_1\varepsilon_2 q_t)\right)\xi\Phi_2(d\varepsilon_2) + \Phi_2(\frac{s_d}{\varepsilon_1 q_t})\right].$$

Also, let $\vartheta_c(\varepsilon_1, q_t)$ be the average profits per unit of net worth of the CMF-financed entrepreneurs, given $\varepsilon_1$ and $q_t$,

$$\vartheta_c(\varepsilon_1, q_t) = \varepsilon_1 q_t f(\overline{\omega}^c(\varepsilon_1 q_t))\xi,$$

and let $\vartheta(q_t)\, n_t$ be the aggregate profits of the entrepreneurial sector, where

$$\vartheta(q_t) = \Phi_1(\frac{s_b}{q_t}) + \int_{\frac{s_b}{q_t}}^{\frac{s_c}{q_t}} \vartheta_b(\varepsilon_1, q_t)\, \Phi_1(d\varepsilon_1) + \int_{\frac{s_c}{q_t}} \vartheta_c(\varepsilon_1, q_t)\, \Phi_1(d\varepsilon_1).$$

The aggregate budget constraints for the entrepreneurs can then be written as equation (33).

# 3 Agency costs

We show that the resource loss due to the presence of agency costs in the economy, $y_t^a$, corresponds to the sum of the monitoring costs faced by banks and CMFs, and of the information acquisition costs incurred by banks. For simplicity, we focus on the steady state of the model and denote steady state variables by dropping the time subscript.

First, devide the resource constraint of the economy by $z$, and notice that $\frac{I}{z} = \delta\frac{K}{z}$, $\frac{y}{z} = \psi_y(q)\, q\xi(1-\delta+r)$ and $\frac{e}{z} = \vartheta(q)(1-\delta+r) - 1$. Combining the budget constraint of the household,

$$c = wh + (r-\delta)\, k$$

with conditions $K = k + z$, $x = wh + rK$, and $x = \psi_x(q)\, \xi(1-\delta+r)\, z$, we obtain

$$\frac{c}{z} = \psi_x(q)\, \xi(1-\delta+r) - \delta\frac{K}{z} - r + \delta.$$

From the resource constraint, we can write agency costs as

$$y^a = y - c - e - \delta K,$$

implying that

$$\frac{y^a}{z} = (1-\delta+r)\left[\psi_y(q)\, q\xi + 1 - \vartheta(q) - \psi_x(q)\, \xi\right]$$

Recall that $f\left(\overline{\omega}^j\right) = 1 - g\left(\overline{\omega}^j\right) - \mu\int_0^{\overline{\omega}^j} \omega^j \Phi_\omega(d\omega)$. Use this condition together with equation (16), $\Phi_1(\frac{s_b}{q}) + \int_{\frac{s_b}{q}}^{\frac{s_c}{q}} \Phi_1(d\varepsilon_1) + \int_{\frac{s_c}{q}} \Phi_1(d\varepsilon_1) = 1$, and the definitions of $\psi_m(q)$ and $\psi_\tau(q)$ given in section 2 of this appendix. After rearranging terms, we obtain

$$\frac{y^a}{z} = (1-\delta+r)\left[\mu q\xi\psi_m(q) + \psi_\tau(q)\right]$$

implying that $y^a = y^m + y^\tau$.

## 4 The stochastic steady state

The unique steady state can be obtained as follows. First, we specify one of the endogenous variables, $q$, as exogenous and we treat $\gamma$ as endogenous. For each value of $q$, we can then compute $r, w, \gamma$ and $c$ by solving the equations

$$\begin{aligned} 1 &= \beta\left(1-\delta+r\right) \\ q &= \left(\frac{\alpha}{w}\right)^{\alpha}\left(\frac{1-\alpha}{r}\right)^{1-\alpha} \\ 1 &= \beta\gamma\left\{(1-\delta+r)F(\varepsilon_1 q)\right\} \\ \eta c &= w. \end{aligned}$$

To compute the overall expected profits $F(\varepsilon_1 q)$, given by the steady state version of equation (25), we use the following procedure. First, under our distributional assumptions about the productivity shocks $\varepsilon_1, \varepsilon_2$ and $\varepsilon_3$, we can use some results from the optimal contract literature (see the appendix of Bernanke et al (1999)),

$$\varphi_\omega\left(\overline{\omega}^j\right) = \varphi\left(x\right)\frac{1}{\overline{\omega}^j\sigma}$$

$$f(\overline{\omega}^j) = \Phi\left(x-\sigma\right) + \overline{\omega}^j\left[1-\Phi\left(x\right)\right]$$

$$g(\overline{\omega}^j) = \left(1-\mu\right)\Phi\left(x-\sigma\right) + \overline{\omega}^j\left[1-\Phi\left(x\right)\right],$$

where $\varphi$ and $\Phi$ denote the standard normal, $x \equiv \frac{\log\overline{\omega}^j + 0.5\sigma^2}{\sigma}$ and $j = b, c$. Second, we solve numerically the condition $sg(\overline{\omega}^j\left(s\right)) = \frac{\xi-1}{\xi}$ to obtain the function $\overline{\omega}^j(s)$. The function $\overline{\omega}^b(s)$ for bank-financed firms is derived by defining $s = \varepsilon_1\varepsilon_2 q$ and by using the variance $\sigma^2_{\varepsilon_3}$ of the log-normal distribution. The function $\overline{\omega}^c(s)$ for CMF-financed firms is derived by defining $s = \varepsilon_1 q$ and by using the variance $\sigma^2_{\varepsilon_2} + \sigma^2_{\varepsilon_3}$. The cutoff value for proceeding with the bank loan is found by solving numerically the condition $s_d f(\overline{\omega}^b(s_d))\xi = 1$. Using $s_d$, it is then possible to compute the expected profits for the bank-financed entrepreneur, $F^b(s)$, where $s = \varepsilon_1 q$. The expected profits for the CMF-financed entrepreneur can be computed as $F^c(s) = sf(\overline{\omega}^c(s))\xi$. With this, it is possible to calculate the overall return $F(s)$ to entrepreneurial investment, the thresholds $s_b$ and $s_c$, and the ratios $\frac{x}{z}$, $\frac{K}{x}$ and $\frac{l}{x}$, as given by

$$\frac{x}{z} = \psi_x\left(q; s_b, s_c, s_d\right)\xi\left(1-\delta+r\right)$$

$$\frac{K}{x} = \frac{1-\alpha}{r}$$

$$\frac{l}{x} = \frac{\alpha}{w},$$

where the function $\psi_x(\cdot)$ is the steady state version of the function defined in section 2 of this appendix. Now write the budget constraint of the household as

$$\frac{c}{z} = w\frac{l}{z} + (r - \delta)\frac{k}{z},$$

where $\frac{l}{z} = \frac{l}{x}\frac{x}{z}$ and $\frac{k}{z} = \frac{K}{x}\frac{x}{z} - 1$. Then, compute $z$ as $z = \frac{c}{\frac{c}{z}}$ and use it to compute the aggregate variables $n, x, K, l, k$ and $c$. Finally, use the steady state version of equations (29) and (33) to compute $y$ and $e$, and of the resource constraint (36) to compute $y^a$.

# 5 Evidence on the financial structure

We document differences in corporate finance among the US and the EA. The series used for the EA refer to a changing composition, i.e. they are based on the euro area composition at the time to which the statistics relate. Our focus is on the EMU period but we only consider data up to 2007 in order to exclude the major effects of the financial turmoil, which resulted in a sudden drying up of the market for corporate bonds in both the US and the EA.

**Ratio of bank finance to bond finance.** For the US, the average value of loans to securities over the period 1999-2007 is 0.66. For the EA, the ratio is 5.48, approximately eight times higher. Data are from Flow of Funds Accounts, Table B.102 on the balance sheet of nonfarm nonfinancial corporations. Securities are the sum of commercial paper, municipal securities and corporate bonds. Loans are the sum of bank loans, mortgages and other loans and advances. For the EA, data are from the Euro Area Flow of Funds. Loans are those extended by monetary financial institutions to non-financial corporations. Securities are defined as securities other than shares, excluding financial derivatives, issued by non-financial corporations.

**Debt to equity ratio.** The debt to equity ratio for the US non-farm, non-financial corporate business sector is 0.43 over the period 1999-2007. For the EA, the ratio is 0.64 over the same period. For the US, data are from the Flow of Funds Accounts. Debt is defined as credit market instruments (sum of commercial paper, municipal securities, corporate bonds, bank loans, other loans and advances, mortgages). Equity is defined as market value of equities outstanding (including corporate farm equities). For the EA, data are from the Quarterly Euro Area Accounts. Debt includes loans, debt securities issued and pension fund reserves of non-financial corporations. Equity includes shares and other equity.

**Risk premium on bank loans.** For the US, the mean spread between the loan rate and the Federal Fund rate over the period Jan1999-Dec2007 is 170 bps. For the EA, over the same period, the spread between the average loan rate and the EONIA is 119 bps. To obtain a comparable measure of the cost of loans for the US and EA, and because the time period in our model is a year, we consider loans to non-financial corporations (new businesses) with a maturity interval of below 1 year and with floating rates. In 2007, these loans accounted for approximately 86% of total loans to new businesses in the EA and to 92% in the US. For the US, we use data from the Survey of Terms of Business Lending. For the EA, we use ECB data from MFI Interest Rate Statistics. Since the series for the EA distinguish amounts of up to and including EUR 1 million amount, and amounts above EUR 1 million, we compute average loan rates using relative amounts to build weights. The series on amounts is available only since Jan 2003. We use the actual weight when available and the average weight over the whole period otherwise.

**Risk premium on corporate bonds.** Comparable series for the US and the EA are only available for the mean difference between 7 to 10 years corporate bond yields and government bond yields with a corresponding maturity (ECB data on Financial Market Indicators). Over the period Jan1999-Dec2007, the mean difference is 143 bps for the US. Due to the changing composition of the euro area and the thin market for corporate bonds in the early sample, reliable data for the EA start in 2002. Over the period Jan 2002-Dec 2007, the mean difference is approximately the same in the EA and the US (128 and 126 bps respectively). Therefore, in table 1 we attribute to the euro area the same mean difference observed in the US. Existing studies confirm that no significant differences exist among bond spreads in the US and the EA. Mahajan and Fraser (1986) find no differences in yields between dollar denominated Eurobonds and US bonds with similar characteristics over the period 1975-1983. Using more recent data, Carey and Nini (2007) show that mean differences for A- and BBB-rated firms among US and EA remain small even after accounting for duration and currency effects. Gilchrist, Yankov and Zakrajšek (2009) report mean credit spreads for corporate bonds of short maturity (remaining term-to-maturity of less than 3 years) after grouping them in five quantiles according to their expected default frequencies. Although the mean spreads vary substantially with deafult probabilities, the levels (0.79, 1.03, 1.21, 1.84, and 5.28 percent, respectively) are distributed around our chosen value.

**Default rate on corporate bonds.** Using data from Moody's, we compute the average 12-months default rate on speculative-grade bonds for non-financial corporations. For the period Jan1999-Dec2007, the average figure for the US is 5.37%. For the EA, the average figure over the same period is 4.96%.

**Expected rate of return on capital.** We compute the net rate of return of capital as the gross operating surplus net of depreciation capital as a percentage of total net capital. This measure of the value of capital service flows for corporations is a broad indicator of profit developments. In our model, it captures the average expected net return from accumulating one unit of entrepreneurial capital. Using data from the EU Commission's Ameco database, we compute its average value at 10.9% for the US and 9.3% for the EA, over the period 1997-2005.

The model offers some additional model predictions (not used as targets in the estimation procedure) that can be compared with the data. We document here the evidence presented in table 3.

**Ratio of aggregate consumption to GDP.** The ratio is 0.85 for the US and 0.77 for the EA. Data are for the period 1999-2007 from ESA95 national accounts.

**Ratio of aggregate investment to GDP.** The ratio is 0.19 for the US and 0.21 for the EA. Data are for the period 1999-2007 from ESA95 national accounts.

**Average default rate.** The annual rate is 4.74 percent for the US and 4.25 percent for the EA. We measure the average default rate with Moody's 12-months default rate by speculative-grade rated non-financial corporations, over the period January 1999 to December 2007.

**Ratio of default on loans to default on bonds.** It is 0.80 for the US and 0.73 for the EA. The numbers are taken from Emery and Cantor (2005). Based on an analysis of 582 non-financial corporates between Jan1995 and Jun2003, they find that in the US the default rate on loans is lower than the default rate on bonds by approximately 20%. Similar results are found for european firms. Using data on 29 european non-financial corporate issuers, the approximate reduction in the loan default rate relative to the bond default rate is 27%.

**Share abstain overall.** We use data from the ENSR Entreprise Survey 2002 to sheed light on the share of firms that do not raise external finance. The ENSR survey collects data on small and medium size european entreprises (representing 99.8% of total entreprises in the EA). It is documented that, during the three years previous to the survey, 37 percent of the firms considered did not request a bank loan. Given the size of these firms, it is unlikely that they would finance themselves on the market if they do not do so through banks. We therefore take this number as providing indirect evidence on the share of firms that does not raise external finance.

**Firms' capital as a share of aggregate capital.** Based on US data from the 2004 Survey of Consumer Finances, Sandri (2009) documents that entrepreneurs own around 46% of total wealth.

## 6 Financial variables

We provide analytical expressions for the financial variables used in the numerical application.

The ratio of bank finance to bond finance, $\Upsilon_t$ is defined as the ratio of the funds raised by bank-financed firms to the funds raised by CMF-financed firms. The amount of external finance raised by a producing firm $i$ is $x_{it} - \widehat{n}_{it} = (\xi - 1)\,\widehat{n}_{it}$. It follows that

$$\Upsilon_t = \frac{\psi_x^b\,(q_t)}{\psi_x^c\,(q_t)}.$$

The average risk premia for bank-financed firms and CMF-financed firms are denoted respectively as $rp_t^b$ and $rp_t^c$. Given the solution to the contract, $\overline{\omega}^j(s_{it})$, the risk premium for a firm $i$ that chooses to raise external finance from intermediary $j$, $rp_{it}^j$, is implicitly given by the condition

$$(1 + rp_{it}^j)\,(x_{it} - \widehat{n}_{it}) = s_{it}\overline{\omega}_{it}^j x_{it}, \quad j = b, c.$$

The average risk premia for bank-financed firms and for CMF-financed firms are then given by

$$\begin{aligned} rp_t^b &\equiv \frac{\int_{\frac{s_b}{q_t}}^{\frac{s_c}{q_t}} \int_{\frac{s_d}{\varepsilon_1 q_t}} \left[\left(\frac{\xi}{\xi-1}\right) q_t\varepsilon_1\varepsilon_2\overline{\omega}^b(\varepsilon_1\varepsilon_2 q_t) - 1\right] \Phi_2(d\varepsilon_2)\Phi_1(d\varepsilon_1)}{\int_{\frac{s_b}{q_t}}^{\frac{s_c}{q_t}} \int_{\frac{s_d}{\varepsilon_1 q_t}} \Phi_2(d\varepsilon_2)\Phi_1(d\varepsilon_1)} \\ rp_t^c &\equiv \frac{\int_{\frac{s_c}{q_t}} \left[\left(\frac{\xi}{\xi-1}\right) q_t\varepsilon_1\overline{\omega}^c(\varepsilon_1 q_t) - 1\right] \Phi_1(d\varepsilon_1)}{\int_{\frac{s_c}{q_t}} \Phi_1(d\varepsilon_1)}. \end{aligned}$$

The aggregate debt to equity ratio, $d_t$, is defined as the ratio of all debt instruments used by producing firms to the aggregate net worth of existing firms,

$$d_t = (\xi - 1)\left[\psi_x^b\,(q_t) + \psi_x^c\,(q_t)\right].$$

The default rate on bank loans, $\Delta_t^b$, is defined as the share of firms which approaches banks but cannot repay the debt,

$$\Delta_t^b = \frac{\int_{\frac{s_b}{q_t}}^{\frac{s_c}{q_t}} \int_{\frac{s_d}{\varepsilon_1 q_t}} \Phi_3\left(\overline{\omega}^b(\varepsilon_1 \varepsilon_2 q_t)\right) \Phi_2(d\varepsilon_2)\Phi_1(d\varepsilon_1)}{\int_{\frac{s_b}{q_t}}^{\frac{s_c}{q_t}} \Phi_2(d\varepsilon_2)\Phi_1(d\varepsilon_1)}.$$

Similarly, the default rate on bonds, $\Delta_t^c$, is given by the share of firms which borrow from CMFs but cannot repay the debt,

$$\Delta_t^c = \frac{\int_{\frac{s_c}{q_t}} \Phi_{2*3}\left(\overline{\omega}^c(\varepsilon_1 q_t)\right) \Phi_1(d\varepsilon_1)}{\int_{\frac{s_c}{q_t}} \Phi_1(d\varepsilon_1)}.$$

Average default amounts to the share of firms which sign a contract with either a bank or a CMF but cannot repay the debt.

The gross expected return on equity is measured by $(1-\delta+r)F(\varepsilon_1 q) = \frac{1}{\beta\gamma}$. Our target for a net expected return on equity, $r_t^e$, is then given by

$$r_t^e = \frac{1}{\beta\gamma} - 1.$$

# 7 Robustness analysis: an alternative choice for $\tau$ and $\mu$.

The results reported in table 2 of the paper show that the model requires different information acquisition costs, in order to replicate US and EA data. The parameter $\tau$ is .001 for the US and .028 for the EA. In the paper, we argue that such difference may be needed for the model to capture the data, because monitoring costs are assumed to be identical despite differences in bankruptcy laws and procedures.

In order to check the robustness of our results, we have investigated alternative parameters. More specifically, we have maintained the monitoring costs $\mu$ for the US at .15 (in line with available empirical evidence), while allowing the calibration procedure for the EA to select the monitoring parameter, using the parameters of the US model as initial values, and restricting $\tau$ to take progressively closer values to the one obtained for the US.

The columns labelled "data"and "model EA" in tables A1 to A4 coincide with the results presented in the paper, whereas the columns labelled "model EA1" provide the alternative calibration. Indeed, the best fit is found for a lower level of monitoring costs, $\mu = .124$, and for an information acquisition cost parameter that is much closer to the one selected for the US, i.e. $\tau = .005$. Nonetheless, the fit of "model EA1" with the data is worse than the one offered by the benchmark EA model: numerically, it appeared to be very difficult to get closer to the data, when restricting $\tau$ to values similar to those selected by the numerical procedure for the US. Note, though, that the model predictions and the focal statistics are qualitatively similar: we interpret this is as a sign of robustness of our results. Therefore, our interpretation of the corporate finance differences remains valid under this alternative parameterization.

As a further robustness check, we also attempted to solve for the model by equating the value of $\tau$ in the EA to the value of 0.001 in the US, and solve for $\mu$. We then had considerably greater numerical difficulty to match the observed facts than already emanate from the column labeled "model EA1". We suspect that the rather intricate nonlinearities in these six equations may prevent the system to have a solution at all: there obviously is no reason to expect a nonlinear system of six equations in six unknowns to have a solution. The same problem may be the reason underlying the apparent worsening fit in the column "model EA1". While this may be an interesting issue that could be explored further, it is an issue that leads us rather far astray from the main focus of the paper.

Table A1: Financial facts

| **Variable** | **data US** | **mod US** | **data EA** | **mod EA** | **mod EA1** |
|---|---|---|---|---|---|
| Bank to bond finance ratio | 0.66 | 0.67 | 5.48 | 5.48 | 5.48 |
| Debt to equity ratio | 0.43 | 0.43 | 0.64 | 0.64 | 0.63 |
| Risk premium on loans (bps) | 170 | 169 | 119 | 119 | 126 |
| Risk premium on bonds (bps) | 143 | 143 | 143 | 147 | 132 |
| Default rate on bonds (pp) | 5.37 | 5.36 | 4.96 | 4.79 | 5.01 |
| Return to entr capital (pp) | 10.90 | 10.93 | 9.30 | 9.29 | 9.28 |

Table A2: Financial predictions

| **Parameters** | **Symbols** | **Model** | | |
|---|---|---|---|---|
| | | **US** | **EA** | **EA1** |
| Monitoring costs | $\mu$ | 0.150 | 0.150 | 0.124 |
| Information acquisition | $\tau$ | 0.001 | 0.028 | 0.005 |
| Coeff. discount rate entr. | $\gamma$ | 0.939 | 0.953 | 0.953 |
| Project size to net worth | $\xi$ | 1.551 | 2.102 | 1.784 |
| Standard dev. $\varepsilon_1$ | $\sigma_{\varepsilon_1}$ | 0.037 | 0.014 | 0.003 |
| Standard dev. $\varepsilon_2$ | $\sigma_{\varepsilon_2}$ | 0.024 | 0.069 | 0.031 |
| Standard dev. $\varepsilon_3$ | $\sigma_{\varepsilon_3}$ | 0.488 | 0.335 | 0.405 |
| Overall variance unobserved shocks | $\sum_{j=2}^{3} \sigma_{\varepsilon_j}^2$ | 0.238 | 0.117 | 0.165 |
| Precision avail info to precision private info | $\sigma_{\varepsilon_2}^2 / \left(\sigma_{\varepsilon_1}^2 + \sigma_{\varepsilon_2}^2\right)$ | 0.294 | 0.958 | 0.991 |
| Precision total info to precision public info | $\sigma_{\varepsilon_1}^2 / \sum_{j=1}^{3} \sigma_{\varepsilon_j}^2$ | 0.006 | 0.002 | 0.000 |
| Variance private info to info acquisition cost | $\sigma_{\varepsilon_2}^2 / \tau$ | 0.590 | 0.168 | 0.190 |

Table A3: Additional model predictions and data

| **Variable** | **data US** | **mod US** | **data EA** | **mod EA** | **mod EA1** |
|---|---|---|---|---|---|
| Consumption to GDP ratio | 0.85 | 0.78 | 0.77 | 0.76 | 0.78 |
| Investment to GDP ratio | 0.19 | 0.21 | 0.21 | 0.21 | 0.22 |
| Average default rate | 4.74 | 5.63 | 4.25 | 4.08 | 4.87 |
| Def. rate loans to def. rate bonds ratio | 0.80 | 1.12 | 0.73 | 0.82 | 0.97 |
| Share abstain overall | n.a. | 0.22 | 0.37 | 0.40 | 0.19 |
| Entrepr. capital to aggr. capital ratio | 0.46 | 0.25 | n.a. | 0.24 | 0.21 |

Table A4: Additional model predictions

| | Model | | |
|---|---|---|---|
| **Variable** | **US** | **EA** | **EA1** |
| Share abstain | 0.028 | 0.000 | 0.000 |
| Share bank | 0.503 | 0.910 | 0.875 |
| Share CMF | 0.469 | 0.090 | 0.125 |
| Drop-out if banking | 0.376 | 0.444 | 0.216 |
| Aggr. markup | 1.041 | 1.021 | 1.031 |
| Agency costs to GDP ratio | 0.004 | 0.024 | 0.006 |