# Discussion of "Credit Market Frictions and the Productivity Slowdown

Marshall Reinsdorf

Statistics Department, IMF

Presented at Brookings Forum on Slow Growth in Productivity

Sept. 8, 2016

# A New Approach to Credit Market Frictions

- Paper tests hypothesis that credit market frictions contributed to a productivity slowdown in the U.K. that has persisted in the years since the financial crisis

- The literature on slowdowns and credit market frictions tends to look at supply side problems (e.g. deleveraging and regulatory pendulum swing after the Financial Crisis, Japan's "lost decade", "credit crunch" of 1991)

- This paper is different: it focuses on frictions arising on the demand side

- Model generates Nash equilibrium in which lending is affected by probabilities of defaulting

# New Approach to Credit Market Frictions

- Cobb-Douglas production function with weight on capital of $\alpha$ and an added returns-to-scale parameter of $\eta < 1$

- Price of capital is $\rho = 1 +$ interest rate paid by lender for funds

- If no default F.O.C. imply that Marginal Product of Capital = $\rho$

- Probability of repayment for firm n is $\phi_n$

- When $\phi_n < 1$, $MPK = \rho/\phi_n$

- **As $\phi_n$ becomes lower, optimal capital stock falls**

# New Approach to Credit Market Frictions

- Managerial effort determines $\phi_n$

- Firms with more collateral have more to lose from default, so their $\phi_n$ is higher (other things being equal)

- A larger return from the investment after paying the lender also induces more managerial effort

- Lender may demand a large share of the return from the investment even though this makes $\phi_n$ lower

- Lowering $\phi_n$ causes scale effects and input substitution

- Dispersion of the $\phi_n$ implies misallocation of capital

# Effect on output and labor productivity

- $\phi_n$ is a sufficient statistic for effects on output and productivity

- Taking L as fixed, aggregate loss of output is:

$$1 - \left[\sum \omega_n \phi_n^{1 + \eta\alpha/(1-\eta)}\right]^{(1-\eta)/(1-\alpha\eta)}$$

- Probabilities of default are raised to a power > 1 and averaged, then average is raised to a power < 1 and subtracted from 1

- Formula assumes that output = 0 if default occurs and that wage rate = the equilibrium wage with L held fixed

- Change in aggregate labor productivity depends on changes in the $\phi_n$, in firms' "technology", and in the interest rate

# What if we assume a longer life for capital stock?

- 1 year payback period for investment makes the math clean
  - To adjust for default costs can just divide by $\phi_n$
  - Capital stock moves to equilibrium value

- With a longer, more realistic service life, adjustment of capital stock would be more gradual

- But the proportional effect of default costs on the user cost of capital $\delta+i+\Delta$ would be much larger than on $(1+i)/\phi_n$

- Larger desired adjustments achieved more slowly might have about the same impact on output and productivity

# **Empirical Results**

- Authors estimate default probabilities for a sample of firms

- Implied reduction in output averages 6.6 percent in 2004-2007 in baseline case, and 10.5 percent in 2009-2012

- Effect on productivity growth averages -0.6 percent per year over 2005-2012, or about -0.65 in the just 2009-2012

- Lack of an effect on productivity growth may reflect the falling interest rate

- But looking just at SMEs, there is more evidence for a role of credit frictions in the productivity slowdown: effect is -0.725 in years after crisis, but -0.3 in 2005-2007

# Misallocation

- Two approaches tested—one based on covariance with weights, and another based on counterfactual where all firms have the mean probability of repayment

- Covariance estimates imply no misallocation effect

- But my interpretation of the "counterfactual" approach is that allocation got worse after the crisis, contributing around 0.5 percentage points to the productivity slowdown

# Below-trend capital deepening might matter
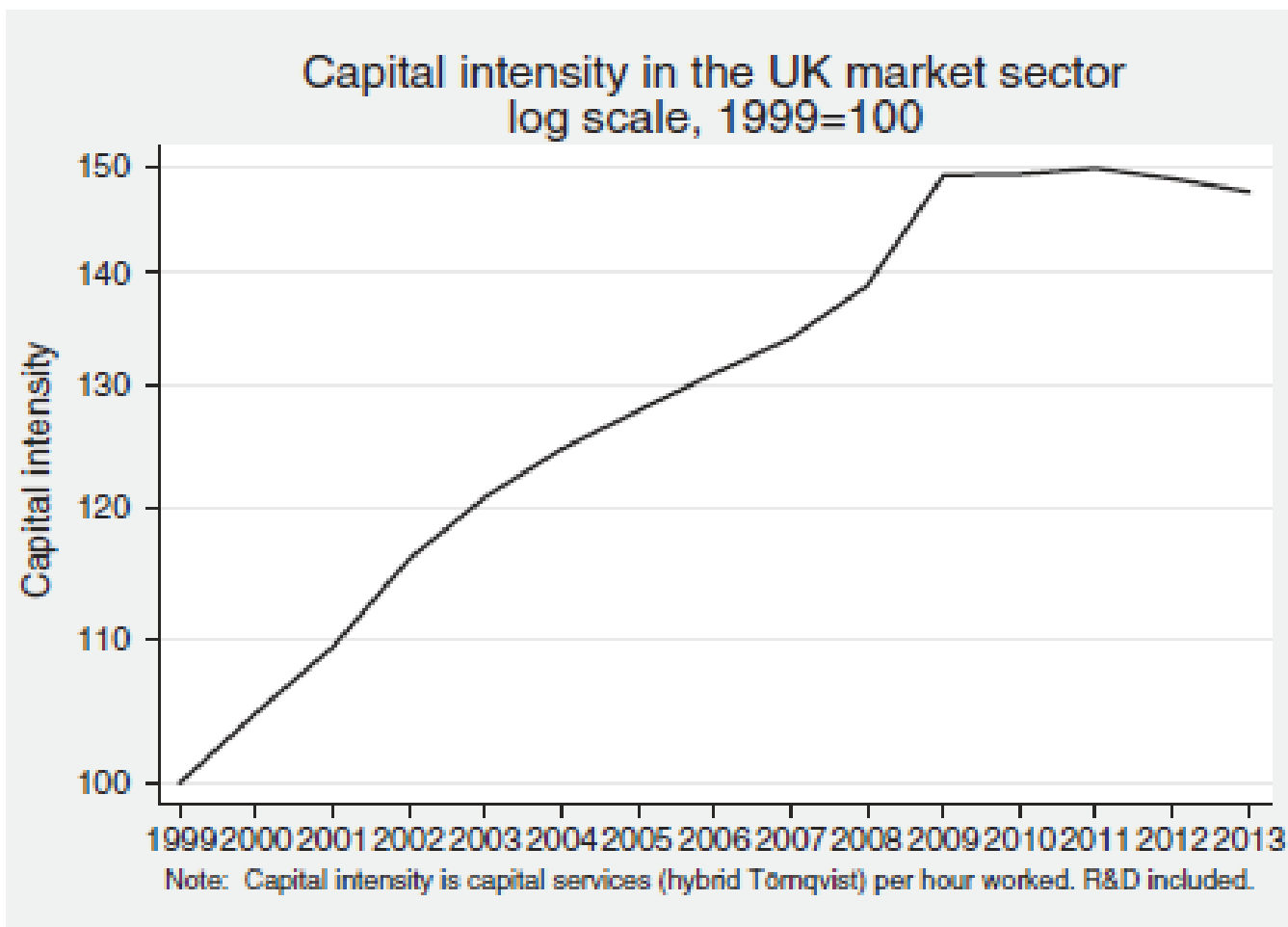


Source: Oulton and Wallis, 2016

# Concluding thoughts and suggestion

- Model is elegant, with straightforward empirical implications (once the challenge of estimating default probabilities has been overcome!)

- Helpful new perspective on credit market frictions from weaker borrowers

- The large scale effects implied by of $\eta = \tfrac{3}{4}$ and assumption of quick adjustment may overstate the impact of default

- Add a price of capital goods to the model, both to get the units correct and because (possibly unmeasured) changes in capital goods prices help to explain the seeming large productivity impact of shortfalls in investment