Consumer Demand and Credit Supply as Barriers to Growth for Black-Owned Startups

Eugene Tan
University of Toronto

Teega Zeida
Brock University,
FRBMN

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Motivation

- Entrepreneurship viewed as potential to foster wealth generation
  - Credit constraints have been shown to be important barriers for business formation and growth;
  - Demand-side factors (e.g., lower demand) also shape the size and growth of businesses.
- Here, we ask how these factors differentially shape Black-owned versus White-owned businesses
- More broadly, we then ask what are the implications of our findings for the racial wealth gap and demand vs credit-based responses.

This paper

Theory

- Formulate a framework where profit-maximizing firms face downward sloping demand curves with different price elasticities.
- Derive two key equations to show that:
  - average differences in capital intensity across Black- and White-owned firms can be used to identify the presence of credit wedge;
  - average differences in the ratio of revenue to capital (the average revenue product of capital) can be used to identify the presence of consumer demand wedge.

This paper

Data

- **Finding 1**: Black- relative to White startups face greater demand- and supply-side wedges in the cross-section.
- **Finding 2**: Within a cohort, initial demand-side wedges are more persistent than initial credit wedges.
- Extensive robustness: *product homogeneity, productivity differences*, firm riskiness, survivorship bias, versions of employment, etc.
- **Big picture:**
  - Demand-side factors appear to be *at least as important and more persistent* barriers than credit access.
  - Policy that focuses only on subsidizing factor supply might not address long-term disparities like the racial wealth gap.

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Literature

- ***Discrimination***:
  - **Mostly on direct cost of capital, some on credit rationing:**
    Cavalluzzo et al.(2002), Blanchflower et al (2003), Chatterji and Seamans (2012), Fairlie et al (2020), Chiplunkar and Goldberg (2021)
  - **On consumer discrimination against racial minorities:**
    Borjas and Bronars (1989), Leonard et al. (2010), Doleac and Stein (2013), Edelman and Luca (2014), Kakar et al. (2018) on eBay/Airbnb, Cook, Jones, Logan and Rosé (2022)
  - We emphasize consumer discrimination through a macro / misallocation framework
- ***Misallocation***:
  Hsieh and Klenow (2009), Foster et al (2008), Hsieh et al. (2019), Bento and Hwang (2021), Morazzoni and Sy (2022) ...
  - a simple extension of the standard framework to detect consumer discrimination
- ***Racial wealth gap persistence***: Derenoncourt et al. (2021), Aliprantis et al. (2021), Boerma and Karabarbounis (2021)

Outline

- Framework
- Data and Baseline results
- Further validation and robustness
- Dynamics
- Conclusion

Section 1

Framework

Generic model of static profit maximization

Entrepreneur i's profit function:

$$\pi_i = p(y_i, d_i; \tau_g^d) y_i - (1 + \tau_g^r) r k_i - w l_i, \quad g \in \{B, W\}$$

- Generic inverse demand curve $p\left(y_i, d_i; \tau_g^d\right)$.
  - d_i: idiosyncratic demand shifter
  - $\tau_{\mathbf{g}}^{\mathbf{d}}$: **group-based (consumer) demand wedge.**
  - $\frac{\partial p}{\partial \tau_g^d} > 0$
- CES + CRTS production function

$$y_i\left(k_i, l_i\right) = \left(\alpha k_i^{\frac{\eta}{\eta-1}} + (1-\alpha) l_i^{\frac{\eta}{\eta-1}}\right)^{\frac{\eta-1}{\eta}}$$

  - identical production function for all (α, η)
  - labor cost w same for all
  - $\tau_{\mathbf{g}}^{\mathbf{r}}$: **group-based (credit) supply wedge.**
- effect of τ_s on profit: $\frac{\partial \pi_i}{\partial \tau_g^d} > 0, \frac{\partial \pi_i}{\partial \tau_g^r} < 0$

Supply-side wedge as average differences in capital intensity

Capital-Labor ratio

$$\log \frac{k}{l} = \underbrace{\log \varepsilon_{k,l}}_{\text{MRTS (Elasticity)}} - \log r - \underbrace{\log\left(1+\tau_g^r\right)}_{\text{Capital wedge}} + \log w$$

- $\varepsilon_{k,l}$: Does not depend on τ_g^d with CES assumption
- Implications with wedges
  - Financial: $\uparrow \tau_g^r \implies \downarrow k/l$
  - Demand: k/l has no direct relationship to τ_g^d (indirectly affected by $\varepsilon_{k,l}$ if we relax CES assumption).
- Financial wedge affects "factor mix", not revenue per se.

$$\text{Avg. group diff} = \mathbb{E}\log\left(\frac{k}{l}\right)_{iB} - \mathbb{E}\log\left(\frac{k}{l}\right)_{iW} \propto \tau_B^r - \tau_W^r$$

- If $\mathbb{E}\log\left(\frac{k}{l}\right)_{iB} - \mathbb{E}\log\left(\frac{k}{l}\right)_{iW} > 0$: B face greater credit wedge.

Supply-side wedge as average differences in capital intensity

Threats to identification?

$$\log \frac{k}{l} = \underbrace{\log \varepsilon_{k,l}}_{\text{MRTS (Elasticity)}} - \log r - \log\left(1 + \tau_g^r\right) + \log w$$

- **Focus is on group differences** (τ_g^r) instead of individual characteristics (τ_{ig}^r)
  - Slight downwards bias via Jensen's inequality
- In the empirical section, we will control for observable related factors.

Demand-side wedge as average differences in revenue to capital

Average return product of capital : $ARPK \triangleq PY/K$

$$\log ARPK = \underbrace{\log MRPK - \log \varepsilon_k}_{\equiv \text{Direct financial frictions effect}} + \underbrace{\log\left(1+\mu\left(\tau_g^d, d; \tau_g^r\right)\right)}_{\equiv \text{Net demand effect}}$$

- Direct financial frictions effect: $\uparrow \tau_g^r \implies \uparrow$ ARPK
  (key "identification" in recent lit for het financial constraints τ_g^r)
  - if Black entrepreneurs face **only** financial discrimination, they would *always* have higher measured ARPK and lower k/l.
- Net demand effect (μ_g): markup, depends on
  - Direct: d, τ_g^d (Demand curve: $\uparrow \tau_g^d \Rightarrow \uparrow P \Rightarrow \uparrow \mu_g$)
  - Indirect: τ_g^r (Shifts MC: $\uparrow \tau_g^r \Rightarrow \uparrow P \Rightarrow \uparrow \mu_g$)

Demand-side wedges as average differences in revenue to capital

Average return product of capital : $ARPK \triangleq PY/K$

- average difference across group:
  To fix ideas,

$$\mathbb{E}\log ARPK_B - \mathbb{E}\log ARPK_W \approx \underbrace{\tau_B^r - \tau_W^r}_{\equiv \Delta\tau^r} + \underbrace{\mu_B - \mu_W}_{\equiv \Delta\tau^d}$$

  If Black entrepreneurs face greater
  - credit wedge: $\Delta\tau^r > 0$
  - demand wedge: $\Delta\tau^d < 0$
- Lower average revenue for Black firms implies that effect of demand wedges dominates that of credit wedges.

Taking stock

For demand curves with differences in price elasticities (or heterogeneous markups)

- k/l useful for detecting financial barriers (credit rationing)
- PY/K useful for detecting consumer demand wedge when studied jointly with k/l.

What does the data say?

Section 2

Data and Cross-Sectional Facts

Data: Kauffman Firm Survey

- Kauffman Firm Survey (KFS): **Single-cohort**, sample of all new firms in 2004 in the US, tracked through 2011
- Key variables: capital stock (types), employment, number of owner-operators, revenues, race, etc

Table: Summary Statistics

	Percentile	Revenue ($)	Non-cash assets ($)	Employment (#)
White	25	28,477	12,619	0
	50	108,713	46,710	1
	75	395,155	170,979	4
Black	25	9,679	6,500	0
	50	31,941	24,590	1
	75	139,934	86,999	3

Empirical strategy

- Analyze differences in k/l and $ARPK \equiv PY/K$, across Black and White firms

$$\log(k/l)_{i,j,t} = \alpha + \delta \times I_{black} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it} \quad (1)$$

$$\log(arpk)_{i,j,t} = \alpha + \lambda \times I_{black} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it} \quad (2)$$

- Controls:
  - proxies for productivity: length of prior rel work exp, age, # of hours worked, % of ownership
  - gender, wealth (5 bins, avail. post 2007)
  - we also control for k/l in arpk regression (Eq. 2)
- Through the lens of the model:
  - $\delta < 0$, if Black firms greater financial constraints
  - $\lambda < 0$, if they experience worst demand frictions.

Black startups face a higher relative implicit cost of capital

$$\log(k/l)_{i,j,t} = \alpha + \delta \times I_{black} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it}$$

Table: Capital-labor ratio (k/l)

	(1)	(2)	(3)	(4)
δ	-0.518	-0.493	-0.285	-0.478
	(0.082)	(0.084)	(0.104)	(0.109)
Controls	None	X	X, wealth	X, 2008+
Observations	8590	8545	4394	4450
R^2	0.111	0.143	0.187	0.145
Year FE	✓	✓	✓	✓
Indus. FE	✓	✓	✓	✓

E.g. $r = 4\% \implies$ Black firms face "implicit" cost of 6%.

Black startups charge a lower relative markup

$$\log(arpk)_{i,j,t} = \alpha + \lambda \times I_{black} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it}$$

Table: Average revenue product of capital $[ARPK \equiv PY/K]$

	(1)	(2)	(3)	(4)
λ	-0.670	-0.745	-0.575	-0.694
	(0.078)	(0.067)	(0.093)	(0.092)
Controls	None	X	X, wealth	X, 2008+
Observations	8631	8586	4427	4483
R^2	0.083	0.158	0.175	0.173
Year FE	✓	✓	✓	✓
Indus. FE	✓	✓	✓	✓

Taking Stock of Facts

- **Interpretation: Black entrepreneurs face tighter financial conditions and lower demand**
- Accounting for heterogeneous demand elasticity really matters!
  - ARPK fact alone using factor-misallocation interpretation implies Black firms face a credit subsidy!

Section 3

Further validation and robustness

Further validation and robustness

1. Validation using **homogeneous** goods vs differentiated goods
   - We find that Black-owned businesses face stronger demand frictions when goods are more homogeneous.
2. Robustness across **productivity** bins
   - We find that our results hold in different productivity samples

Validation using homogeneous vs. differentiated goods

- Demand-side wedges should generate larger profitability gap in industries where goods are more homogeneous.
- But demand-side frictions do not affect factor mix.

Let's consider

$$\log(arpk)_{i,j,t} = \alpha + \lambda \times I_{black} + \nu_d \times I_{black} \times I_{homog} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it}$$

$$\log(k/l)_{i,j,t} = \alpha + \delta \times I_{black} + \nu_s \times I_{black} \times I_{homog} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it}$$

- more homogeneous [2-digit] : Manufacturing + Construction

We expect

- $\nu_d < 0$ for $ARPK$
- $\nu_s = 0$ for k/l

Stronger demand wedges for B firms in more homogeneous industries

$$\log(arpk)_{i,j,t} = \alpha + \lambda \times I_{black} + \nu_d \times I_{black} \times I_{homog} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it}$$

Table: Average revenue product of capital $[ARPK \equiv PY/K]$

	(1)	(2)	(3)	(4)
λ	-0.612	-0.369	-0.285	-0.301
	(0.083)	(0.096)	(0.123)	(0.125)
ν_d	-0.557	-0.487	-0.686	-0.669
	(0.245)	(0.296)	(0.338)	(0.338)
Controls	None	X	X, wealth	X, 2008+
Observations	8590	8586	4427	4483
R^2	0.350	0.158	0.176	0.174
Year FE	✓	✓	✓	✓
Indus. FE	✓	✓	✓	✓

Capital intensities do not depend on demand wedges

$$\log(k/l)_{i,j,t} = \alpha + \delta \times I_{black} + \nu_s \times I_{black} \times I_{homog} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it}$$

Table: Capital-labor ratio (K/L)

	(1)	(2)	(3)	(4)
δ	-0.534	-0.525	-0.264	-0.482
	(0.091)	(0.092)	(0.116)	(0.121)
ν_s	0.095	0.230	-0.106	0.086
	(0.239)	(0.246)	(0.264)	(0.269)
Controls	None	X	X, wealth	X, 2008+
Observations	8,590	8,545	4,394	4,450
R^2	0.111	0.143	0.187	0.145
Year FE	✓	✓	✓	✓
Indus. FE	✓	✓	✓	✓

- Survives placebo test

Black startups charge a lower relative markup across productivity bins

$$\log(arpk)_{i,j,t} = \alpha + \lambda \times I_{black} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it}$$

	Baseline (1)	Advanced degree (2)	S-Corp/LLC (3)
	Panel A: No Controls		
λ	-0.680	-0.688	-0.619
	(0.079)	(0.146)	(0.094)
Obs.	8590	1940	5345
R^2	0.350	0.385	0.492
	Panel B: Controls		
λ	-0.754	-0.764	-0.632
	(0.068)	(0.119)	(0.081)
Obs.	8545	1935	5312
R^2	0.475	0.550	0.563
	Panel C: Controls + Wealth		
λ	-0.587	-0.827	-0.558
	(0.094)	(0.136)	(0.130)
Obs.	4394	1027	2768
R^2	0.502	0.586	0.585
Year FE	✓	✓	✓
Indus. FE	✓	✓	✓

Section 4

Dynamics

Dynamics matter

- Profitability and growth are important to generating wealth over time.
- **We then ask:** Are initial race-based wedges persistent?
  - firms can "save out" of financial constraints (e.g., Moll (2014), Midrigan and Xu (2014))
    - capital intensity differences should be less persistent
  - Average revenue productivity differences should be highly persistent

Empirical strategy

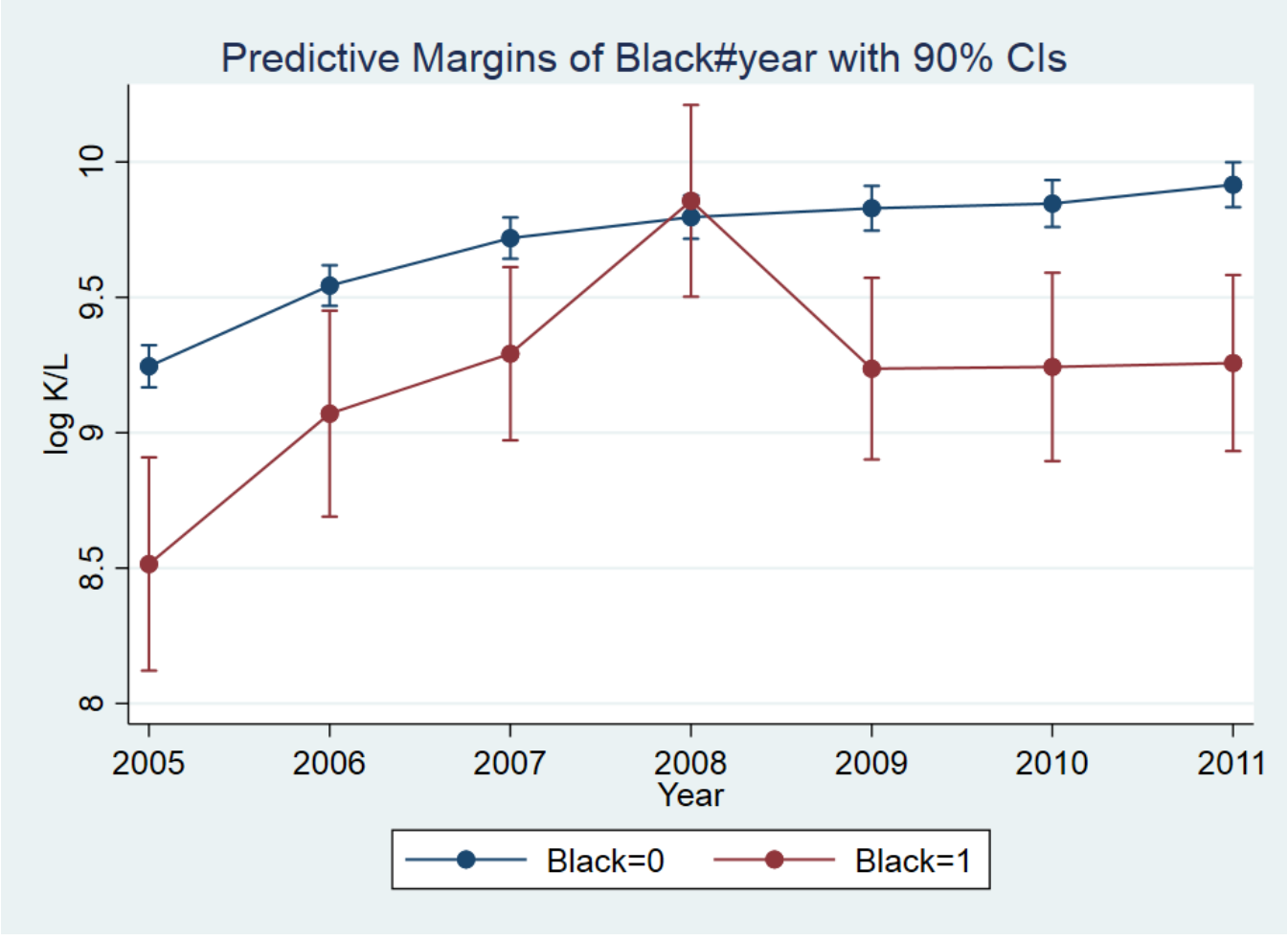
We consider the models below:

$$\log(k/l)_{i,j,t} = \alpha + \delta \times I_{black} + \zeta_t \times I_{black} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{i,t}$$

$$\log(arpk)_{i,j,t} = \alpha + \delta \times I_{black} + \xi_t \times I_{black} + \tilde{X}'_{i,t}\beta + \gamma_j + \theta_t + u_{i,t}$$

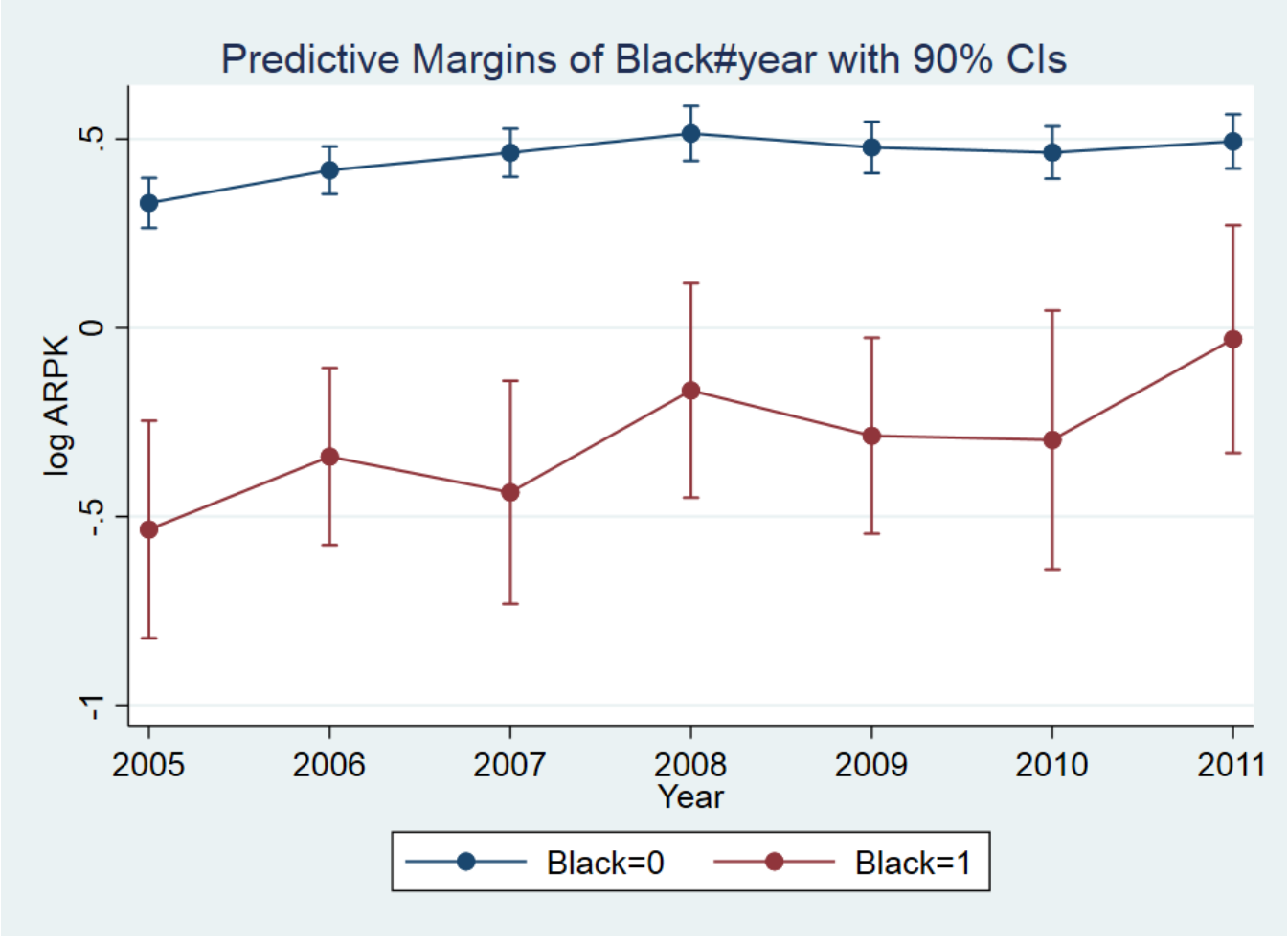
where controls also include k/l in arpk equation.

Initial credit wedges shrink with age



- Initial differences fade out after age 4! Fast convergence...
- ... But widen after Great Recession

But initial demand wedges are more persistent



- demand wedges are acyclical .

Taking Stock

- Left to their own devices, Black entrepreneurs ***can and do*** accumulate sufficient assets to save out of their constraints in **normal times**,
- But they cannot fix demand-side (consumer) barriers on their own
- Financial barriers coupled with demand-side wedges are likely to explain *generational racial wealth gap* through entrepreneurship
- Federal / State level procurement policies targeted towards minority-owned business might be a good idea

Survivorship bias.

Section 5

Conclusion

Conclusion

- We focused on detecting financial and demand wedges across Black and White startups.
- We formalized a framework to identify these two channels.
- Our stylized facts suggest that:
  - Black- relative to White-owned startups face greater consumer demand and credit barriers to growth
  - Demand wedges have lasting effects on returns than financial constraints
- Note of caution: Consumer discrimination as estimated in our framework is at heart an unexplained residual
- This opens room for further research into the source of these disparities, as well as options for policy intervention.

Thank you!

Section 6

Extra Slides

What about selection into different industries?

How does selection change our results?

- **Intensive margin:** Black entrepreneurs might select into industries with lower capital intensities due to credit scarcity (e.g. higher r)
  - Effect of selection comes through $\varepsilon_{k,l}, \varepsilon_k$
  - Implies: Black-owned firms operate with lower k/l and *higher* ARPK
  - E.g. Cobb-Douglas with perfect comp $\implies \frac{Y}{K} = \frac{r}{\alpha}$
- **Extensive margin:** Black entrepreneurs might select into industries with lower startup fixed costs (e.g. lower α)
  - we cannot control directly for α : OVB
  - if selection is based on wealth, then controlling for wealth should deal with it
  - This is concern seems not to be an issue in our empirical results

Back.

Firm-level risk measures

- Riskiness proxied by four measures
  - Three (subjective) computed by Dun and Bradstreet:
    - Commercial credit score: $\downarrow CS \Rightarrow \uparrow Risk$

    - PAYDEX – speed of a firm in repayment:
    $\downarrow PAYDEX \Rightarrow \uparrow Risk$

    - FSSP – financial stress score probability: $\downarrow FSSP \Rightarrow \uparrow Risk$
  - One ex-post risk (objective) measure: a rolling σ(returns on assets)
- Firms with lower subjective and objective measures of risk operate with higher capital intensities.

On average, Black-owned firms are riskier

$$\log[Risk]_{i,j,t} = \alpha + \chi \times I_{black} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it}$$

Table: Correlation of risk measures with race

	Credit Score		Payment speed		Financial Stress		vol(ROA)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Panel A: Full Sample					
χ	-0.521	-0.615	-0.188	-0.169	-0.401	-0.327	0.107	0.139
	(0.063)	(0.097)	(0.079)	(0.060)	(0.049)	(0.113)	(0.044)	(0.069)
Obs	7660	3838	3781	2565	7784	3835	8631	4427
R^2	0.068	0.076	0.032	0.057	0.050	0.055	0.072	0.104
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Indus. FE	✓	✓	✓	✓	✓	✓	✓	✓
Controls	None	X, wealth	None	X, wealth	None	X, wealth	None	X, wealth

For higher quality firms, race now matters less

$$\log[Risk]_{i,j,t} = \alpha + \chi \times I_{black} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it}$$

Table: Correlation of risk measures with race

	Credit Score (1)	Payment speed (2)	Financial Stress (3)	vol(ROA) (4)
	Panel B: Masters/PhD Sample			
χ	-0.740	-0.039	-0.178	-0.141
	(0.170)	(0.055)	(0.170)	(0.089)
Obs	896	574	895	1034
R^2	0.178	0.276	0.176	0.171
	Panel C: S-Corp / LLC Sample			
χ	-0.536	-0.106	-0.175	-0.094
	(0.130)	(0.056)	(0.135)	(0.051)
Obs	2431	1815	2429	2774
R^2	0.089	0.072	0.078	0.129
Year FE	✓	✓	✓	✓
Indus. FE	✓	✓	✓	✓
X, wealth	✓	✓	✓	✓

Accounting for firm riskiness matters for credit wedges

$$\log(k/l)_{i,j,t} = \alpha + \delta \times I_{black} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{it}$$

	Baseline	Credit Score	Payment speed	Financial Stress	vol(ROA)	**Advanced degree**	**S-Corp/LLC**
	(1)	(2)	(3)	(4)	(5)	**(6)**	**(7)**
δ	-0.280	-0.104	-0.172	-0.128	-0.196	0.156	-0.147
	(0.105)	(0.129)	(0.158)	(0.128)	(0.106)	(0.248)	(0.150)
Obs.	4394	3813	2552	3810	4394	1027	2768
R^2	0.187	0.200	0.161	0.199	0.245	0.224	0.165
X, wealth, risk	✓	✓	✓	✓	✓	X, wealth	X, wealth
Year FE	✓	✓	✓	✓	✓	✓	✓
Indus. FE	✓	✓	✓	✓	✓	✓	✓

Yes:

- fully for high-ed Black-owned startups
- partially for incorporated Black-owned startups

Survivorship Bias

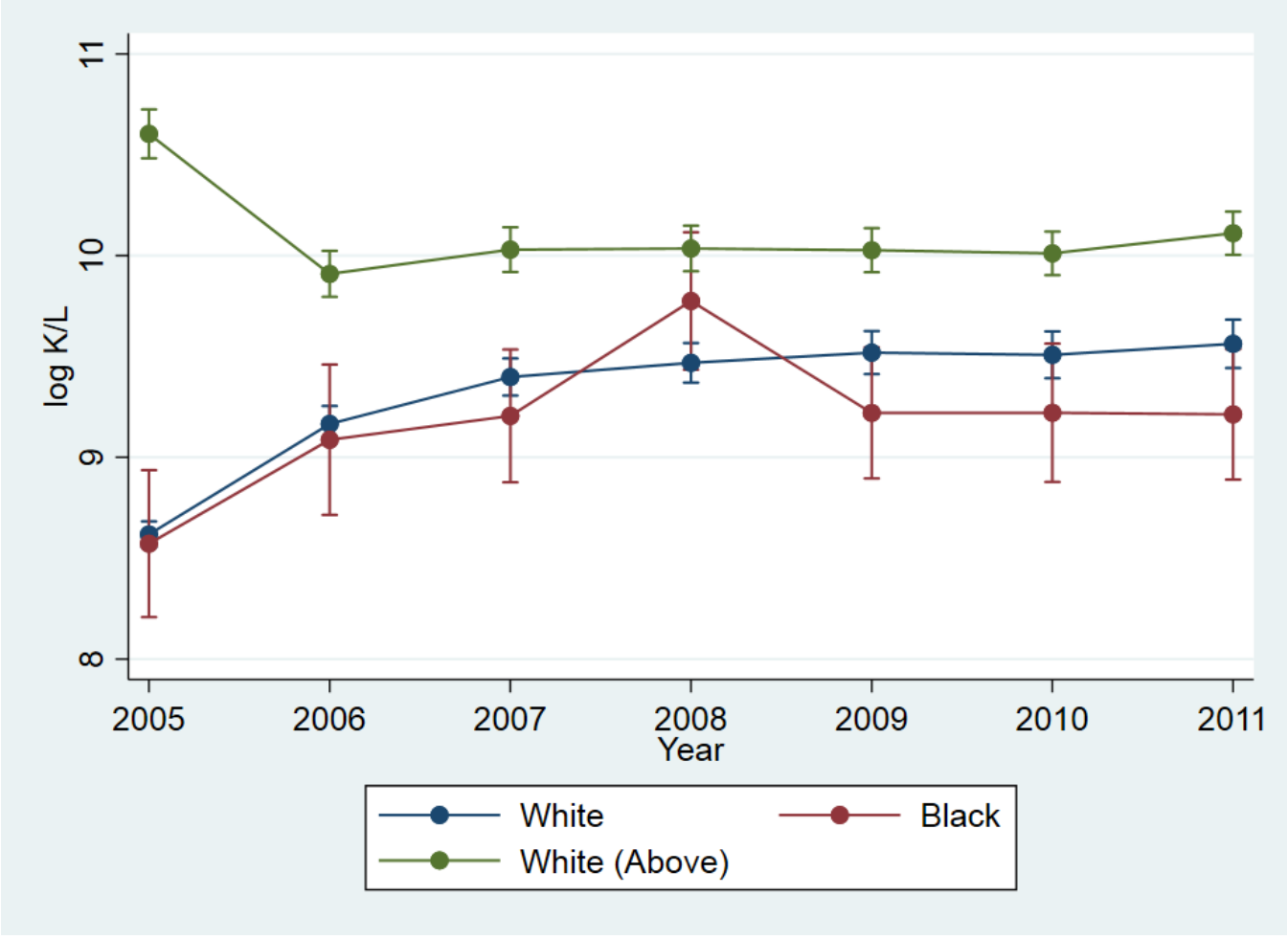
- Claim: Convergence in capital intensity is driven by self-accumulation of assets
- But what if a specific capital intensity threshold for survival exits and mechanically leads to convergence?
- White firms:
  [capital intensity at startup same as Black firms (56%)] +
  [Firms above]

Let's consider the model below

$$\log y_{i,j,t} = \alpha + \delta \times I_{black} + \zeta_t \times I_{black} + \xi_t \times I_{White,above} + X'_{i,t}\beta + \gamma_j + \theta_t + u_{i,t}$$

Back.

Survivorship Bias: capital intensity



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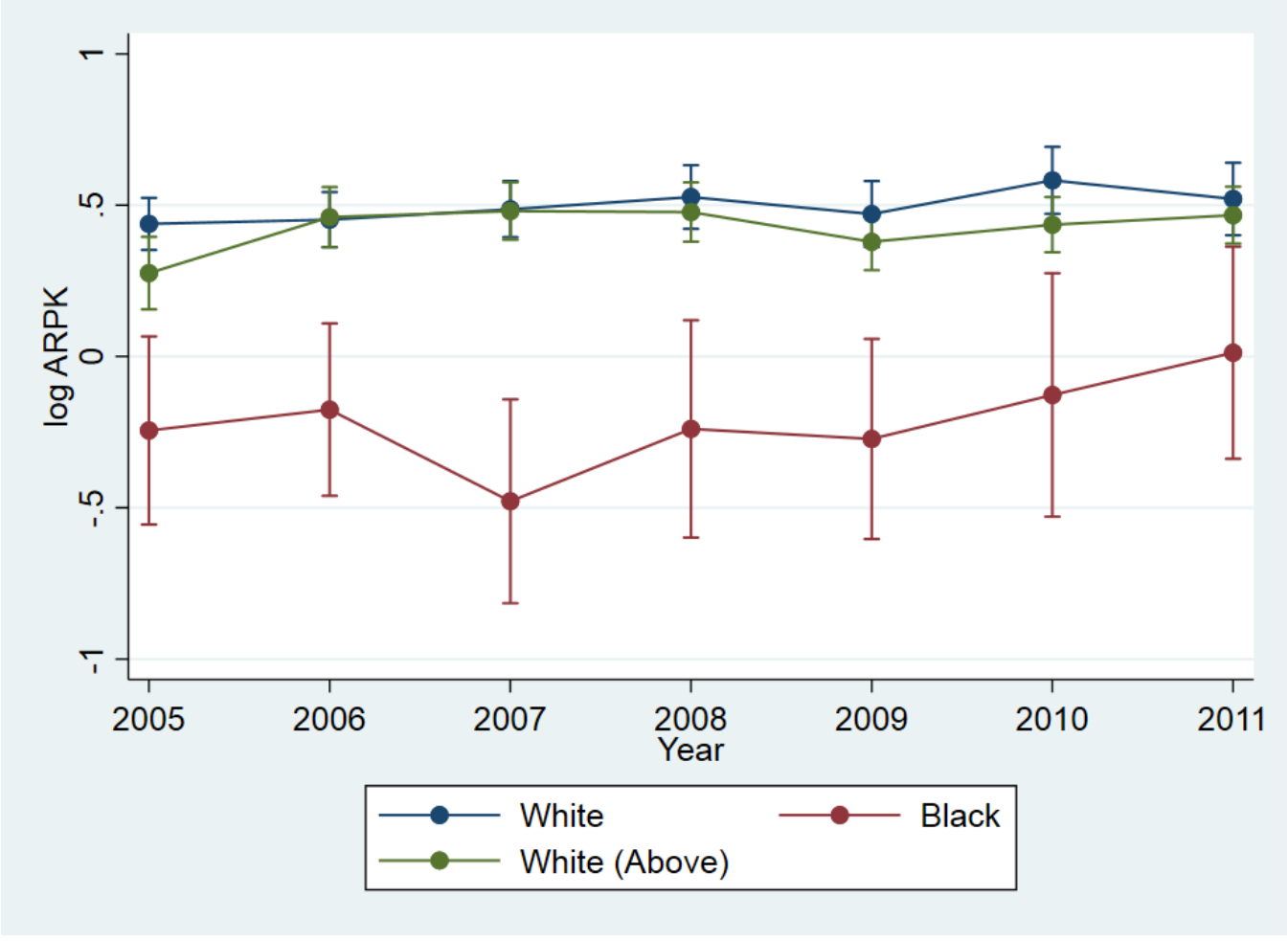
Survivorship Bias: ARPK



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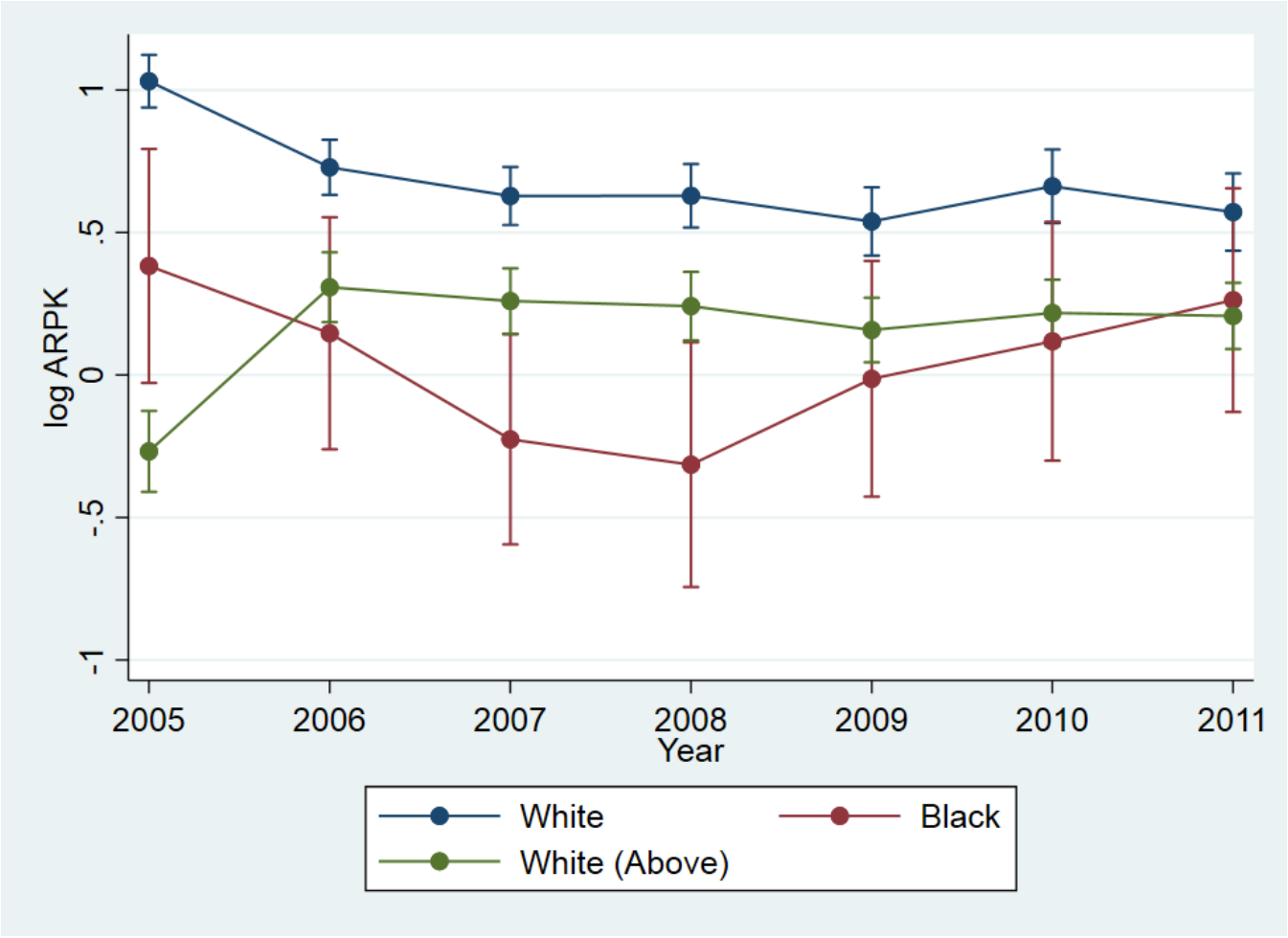
Survivorship Bias: ARPK

w/o kl control



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