Markets, Banks and Shadow Banks

David Martinez-Miera
UC3M and CEPR

Rafael Repullo
CEMFI and CEPR

Jyvaskyla Modelling Risky Financial Institutions

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Motivation (i)

"While **higher capital and liquidity requirements** on banks will no doubt help to insulate banks from the consequences of large shocks, the danger is that they **will also drive a larger share of intermediation into the shadow banking realm**."

S. Hanson, A. Kashyap, and J. Stein (2011)

Motivation (ii)

"While regulators have ample legal authority to contain risks at prudentially regulated banking organizations… it is doubtful whether they have adequate authority to address **threats to financial stability that may arise *outside* the perimeter of prudentially regulated firms**."

Daniel Tarullo (2019)

Introduction

- Main issues to be addressed
  - → What is the difference between banks and shadow banks?
  - → How regulation affects funding through these channels?
  - → How shadow banks affect effectiveness of regulation?
- Goal is to construct a model to shed light on
  - → Effect of regulation on **structure & risk** of financial system
  - → Regulatory tradeoffs

What are shadow banks?

- Financial Stability Board

  → "Global Shadow Banking Monitoring Report"

  → "Global Monitoring Report on Non-Bank Financial Intermediation"

- Broad definition – Non-bank financial intermediation

  "Credit intermediation involving entities and activities outside of the regular banking system."

- Narrow measure

  → Activity-based approach based on five economic functions

Economic functions (activities) of banks

- Maturity transformation

  → Especially if funding with debt with very short maturities

- Risk transformation

  → Especially when tranching produces money-like liabilities

- **Credit origination**

  → Especially if relationship-based

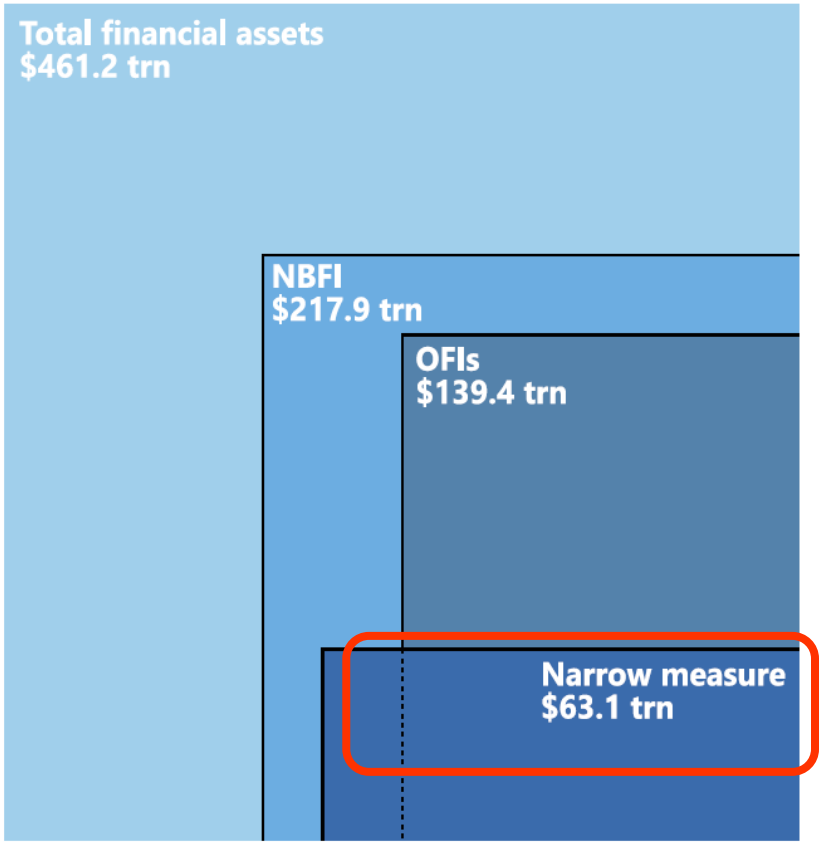
  → **Screening or monitoring-intensive**

Narrow measure of shadow banking

Size of monitoring aggregates and composition of the narrow measure

At end-2022 **Graph 0-1**

Narrowing down to the narrow measure[1]



Monitoring aggregates

The following monitoring aggregates are referenced throughout this report:

(i) The **NBFI** sector is a broad measure of all non-bank financial entities, composed of all financial institutions that are not central banks, banks, or public financial institutions.

(ii) **Other financial intermediaries (OFIs)** are a subset of the NBFI sector, composed of all financial institutions that are not central banks, banks, public financial institutions, insurance corporations (ICs), pension funds (PFs), or financial auxiliaries. OFIs include money market funds (MMFs), hedge funds (HFs), other investment funds (OIFs), captive financial institutions and money lenders, central counterparties (CCPs), broker-dealers (BDs), finance companies (FinCos), trust companies (TCs), and structured finance vehicles (SFVs).

(iii) The **narrow measure of NBFI** is composed of NBFI entities that authorities have assessed as being involved in credit intermediation activities that may pose bank-like financial stability risks (i.e. credit intermediation that involves maturity/liquidity transformation, leverage or imperfect credit risk transfer) and/or regulatory arbitrage, according to the methodology and classification guidance used in the FSB's annual NBFI monitoring exercise.

Narrow measure of shadow banking

Composition of the narrow measure

At end-2022 **Table 0-1**

Economic Functions	Typical entity types[1]	Size[2] (USD trn)	Share (%)	Change in 2022 (%)
EF1 (collective investment vehicles with features that make them susceptible to runs)	MMFs, fixed income funds, mixed funds, credit hedge funds[3], real estate funds	46.9	74.3	-5.2
EF2 (lending dependent on short-term funding)	Finance companies, leasing/factoring companies, consumer credit companies	5.0	7.9	9.7
EF3 (market intermediation dependent on short-term funding)	Broker-dealers, custodial accounts, securities finance companies	4.5	7.1	4.6
EF4 (facilitation of credit intermediation)	Credit insurance companies, financial guarantors, monoline insurers	0.1	0.2	7.2
EF5 (securitisation-based credit intermediation)	Securitisation vehicles, structured finance vehicles, asset-backed securities	5.0	7.8	2.0
Unallocated	Other financial auxiliaries	1.6	2.6	-3.5
Total		**63.1**	**100**	**-2.9**

Economic function #1

- Management of collective investment vehicles
  - → Fixed income funds (29%)
  - → Mixed (equity and credit) funds (19%)
  - → Money market funds (16%)
  - → Credit hedge funds (13%)
- Common feature of these institutions
  - → Actively select (screen) assets included in their portfolios

Economic function #2

- Lending dependent on short-term funding
  - → Finance companies (79%)
  - → Non- bank credit providers (7%)
  - → Leasing companies (6%)
  - → Real estate credit companies (5%)
  - → Credit card companies (2%)
- Common feature of these institutions
  - → Actively select (screen) loan applicants

Our approach

- Focus on two dimensions: **screening** and **regulation**
  - → Whether lenders screen (monitor) borrowers
  - → Whether lenders comply with capital regulation
- Three funding modes (decision of intermediary)
  - → **Regulated banks –** comply with regulation
  - → **Shadow banks –** no regulation and positive screening
  - → **Market finance –** no regulation and no screening
- Shadow banks + market finance = **unregulated finance**

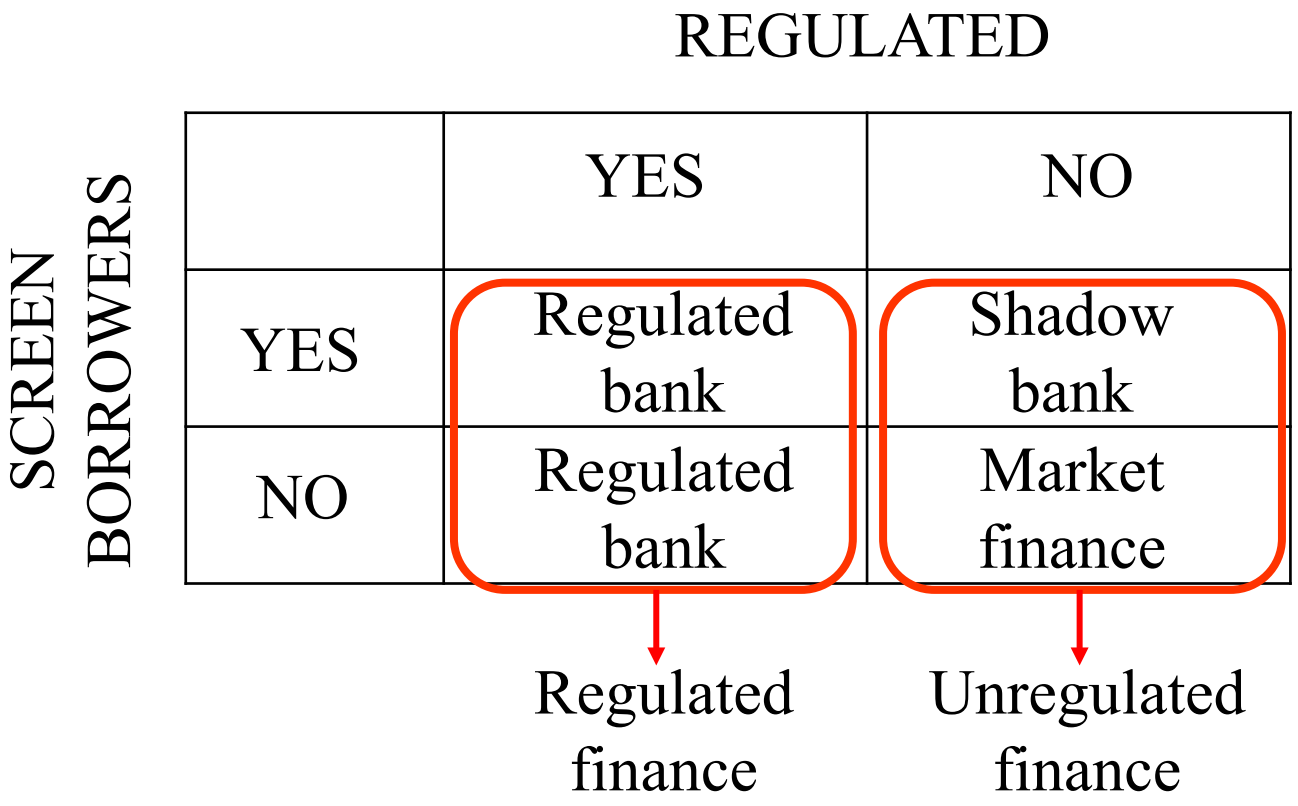
Our approach

- Decisions: To Screen and/or to be subject to regulation

SCREEN BORROWERS	REGULATED: YES	REGULATED: NO
YES	Regulated bank	Shadow bank
NO	Regulated bank	Market finance

Our approach

- Decisions: To Screen and/or to be subject to regulation



Rationale for regulation

- Is there any role for (capital) regulation?

  → Yes

  → **Competitive equilibrium is constrained inefficient**

- But banks choose whether to be regulated or not

  → **Stick and carrot** approach to regulation

  → If no carrot only unregulated finance

- Two possible advantages of being regulated

  → Access to (underpriced) deposit insurance

  → Access to cheaper certification of equity (or assets)

Assumptions on bank capital

- Bank capital is costly but provides "skin in the game"

  → Commitment device for screening borrowers

  → Reduces the cost of (uninsured) debt

- (Unregulated) banks might have capital in equilibrium

  → But (if they do) they have "too-little"

  → Resulting in low screening and high default probability

The emergence of shadow banks

- Trade-off between costs and benefits of regulation
  - → If bank capital regulation is very tough (**stick**)
  - → Banks may prefer not to comply with regulation
  - → And resort to being unregulated (market or shadow banks)
- What are the effects of such decision?
  - → Which type of banks are more prone to change?
  - → What are the effects of such change?
  - → Focus on **risk-taking** (quantities and welfare also analyzed)

What are the carrots?

- **Underpriced deposit insurance**

  → Focus of this presentation

  → Fairly priced deposit insurance is not a carrot

- Cheaper certification of bank's equity (or assets)

  → Novel role for banking supervision

- Both have similar qualitative results

Supervisory certification

- Bank capital (or assets) has to be certified

  → Given incentives to save on costly equity (to abscond)

- Complying with regulation implies certification

  → Novel role for banking supervision

- Not complying with regulation requires private certification

  → Higher cost of operating a bank

Related literature

- Theoretical literature on bank capital and risk-taking
  - → Hellman et al (2000), Repullo (2004), …
  - → Höstrom and Tirole (1997)
- Theoretical literature on shadow banks and regulation
  - → Plantin (2014), Luck and Schempp (2014), Chen, Parlour, Rajan (2016), Begenau and Landvoigt (2018), Harris et al (2024)
- Empirical literature on shadow banks and capital regulation
  - → Buchak et al. (2017), Irani et al (2018)

Overview

- Model setup
- Equilibrium
  - → Model with no capital requirements
  - → Flat capital requirements (Basel I)
  - → Value-at-Risk capital requirements (Basel II)
- Optimal capital requirements
- Extensions
- Concluding remarks

Part 1

Model setup

Model setup

- Two dates ($t = 0, 1$)
- Agents: → Set of potential **entrepreneurs**
  → Set of risk-neutral **banks**
  → Set of risk-neutral **investors**
- Penniless entrepreneurs have projects that require outside finance
- Banks raise funds by issuing uninsured debt and equity capital
  → Deposit insurance introduced later

Entrepreneurs

- Continuum of entrepreneurs of observable types $p \in [0,1]$
- Each entrepreneur of type p has risky project

$$\text{Unit investment} \rightarrow \text{Return} = \begin{cases} A(x_p), & \text{with prob. } 1-p+s_p \\ 0, & \text{with prob. } p-s_p \end{cases}$$

$\rightarrow s_p \in [0, p]$ is the screening intensity of lending bank

$\rightarrow x_p$ is the aggregate investment of entrepreneurs of type p

$\rightarrow$ Success return $A(x_p)$ is decreasing in x_p

Bank screening

- Screening is not observed by debtholders

  → Moral hazard problem

- Screening entails cost per unit of investment

$$c(s_p) = \frac{\gamma}{2}(s_p)^2, \text{ with } \gamma > 0$$

$$c(0) = c'(0) = 0, c'(s) > 0, c''(s) > 0, c'''(s) \geq 0$$

Investors

- Two types of (deep pocket) risk-neutral investors

  → Debtholders: require expected return normalized to 0

  → Shareholders: require expected return $\delta > 0$ (cost of capital)

Competition assumptions

- Free entry of entrepreneurs

  → Enter the loan market until $A(x_i) = R_i$ (loan rate for type i)

  → $A(x_i)$ is the inverse loan demand function

- Perfectly competitive funding market (zero profits for banks)

  → Banks take loan rate for risky entrepreneurs R_p as given

  → Equilibrium loan rate is lowest feasible rate

Correlation assumptions

- Bank specialization

  → Each bank only lends to a single type p of entrepreneurs

  → To avoid modelling correlation/diversification across types

- Default of type p driven by common factor

  → Portfolio return coincides with single project return

  → Loans' prob. of default = Banks' prob. of failure

Part 2

Equilibrium

Part 2a

Model with no capital requirements

Banks' decisions

- Bank lending to entrepreneurs of type p sets

  (1) Capital k_p per unit of loans

  (2) Borrowing rate B_p offered to debtholders

  → Such contract determines screening s_p

- In doing so takes R_p and R_0 and δ as given

  → Assumption of perfectly competitive banking sector

Banks' profits

- Profits of bank lending to type p (per unit of loans)

$$\pi_p = (1 - p + s_p)[R_p - (1 - k_p)B_p] - c(s_p)$$

→ with probability $1 - p + s_p$ gets R_p and pays $(1 - k_p)B_p$

→ with probability $p - s_p$ gets zero (limited liability)

→ minus screening cost $c(s_p)$

Equilibrium

- An equilibrium is array $(k_p^*, B_p^*, R_p^*, s_p^*)$ that solves

$$\min R_p$$

→ subject to incentive compatibility constraint

$$s_p^* = \arg\max_s \left\{(1-p+s)[R_p^* - (1-k_p^*)B_p^*] - c(s)\right\}$$

→ debtholders' participation constraint

$$(1-p+s_p^*)B_p^* \geq 1$$

→ and shareholders' participation constraint

$$\pi_p^* \geq (1+\delta)k_p^*$$

Capital and screening

- IC constraint

$$s_p^* = \arg\max_s \left\{(1-p+s)[R_p^* - (1-k_p^*)B_p^*] - c(s)\right\}$$

$\longrightarrow$ Interior solution characterized by FOC

$$R_p^* - (1-k_p^*)B_p^* = c'(s_p^*)$$

$\longrightarrow$ "Skin in the game" effect

$$\frac{\partial s_p^*}{\partial k_p^*} > 0$$

Proposition 1

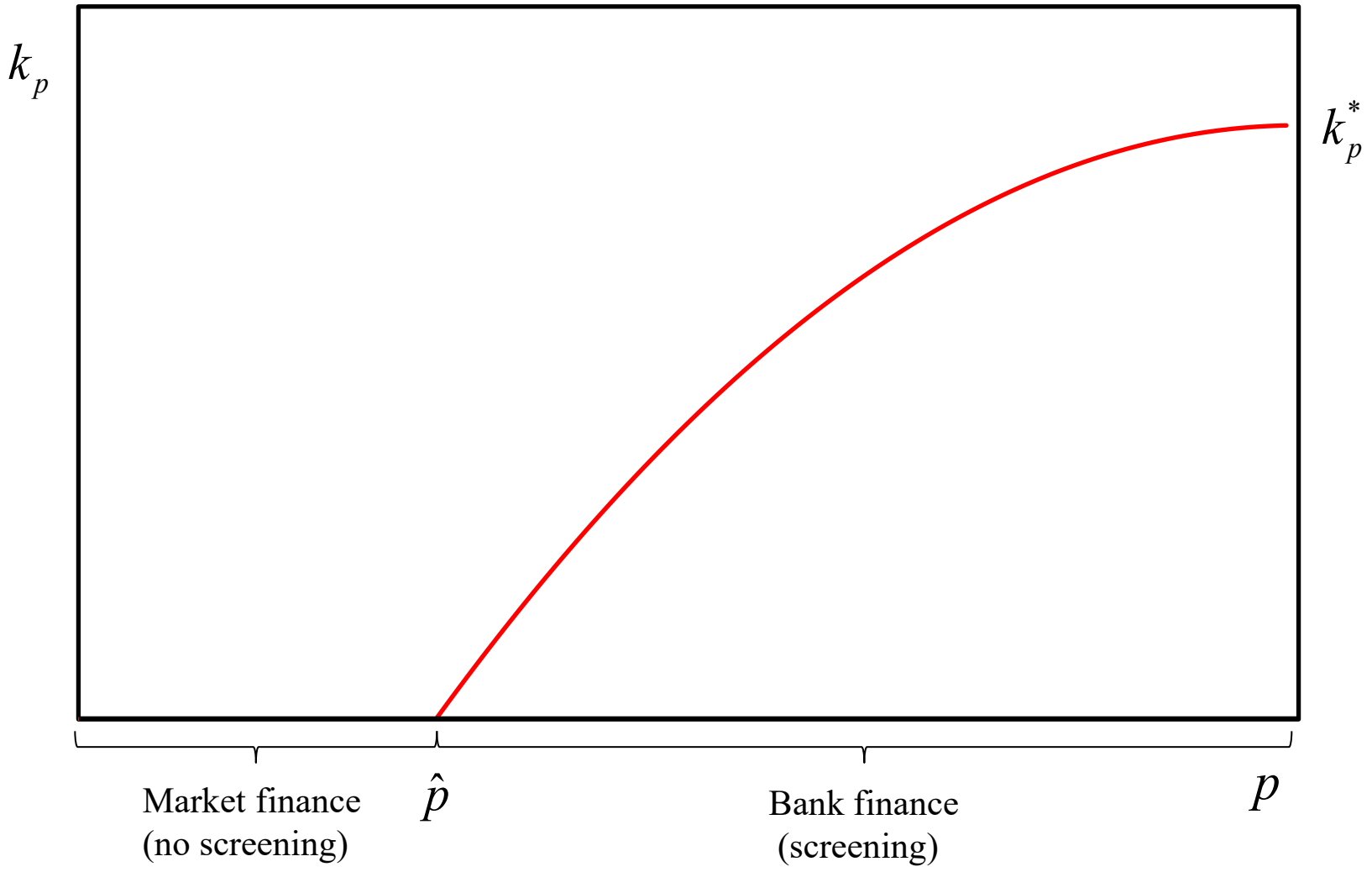
- There exists a marginal type

$$\hat{p} = 1 - \sqrt{\frac{1+\delta}{\delta c''(0)}}$$

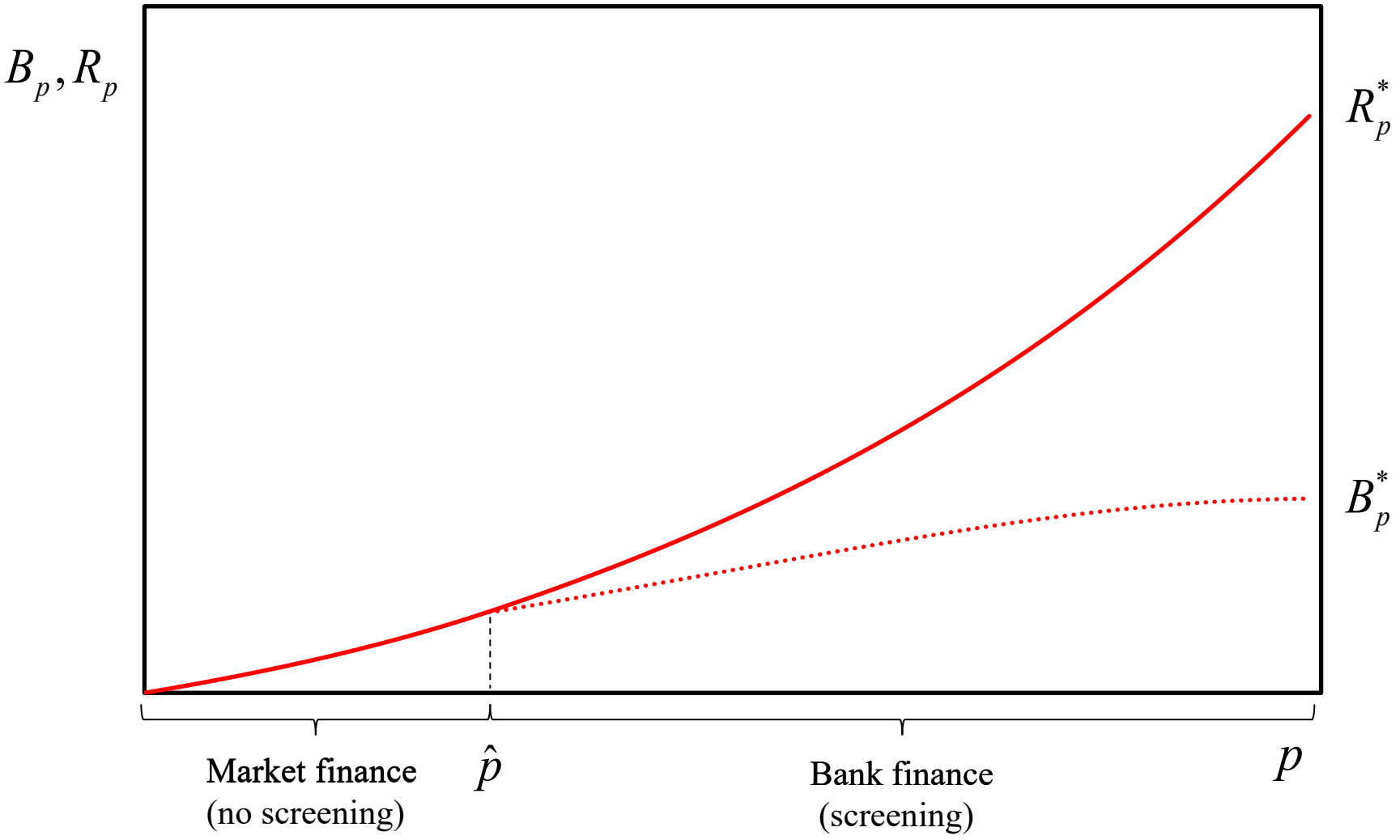
→ Safer types $p \leq \hat{p}$ choose market finance: $s_p^* = k_p^* = 0$

→ Riskier types $p > \hat{p}$ choose bank finance: $s_p^* > 0$ and $k_p^* > 0$

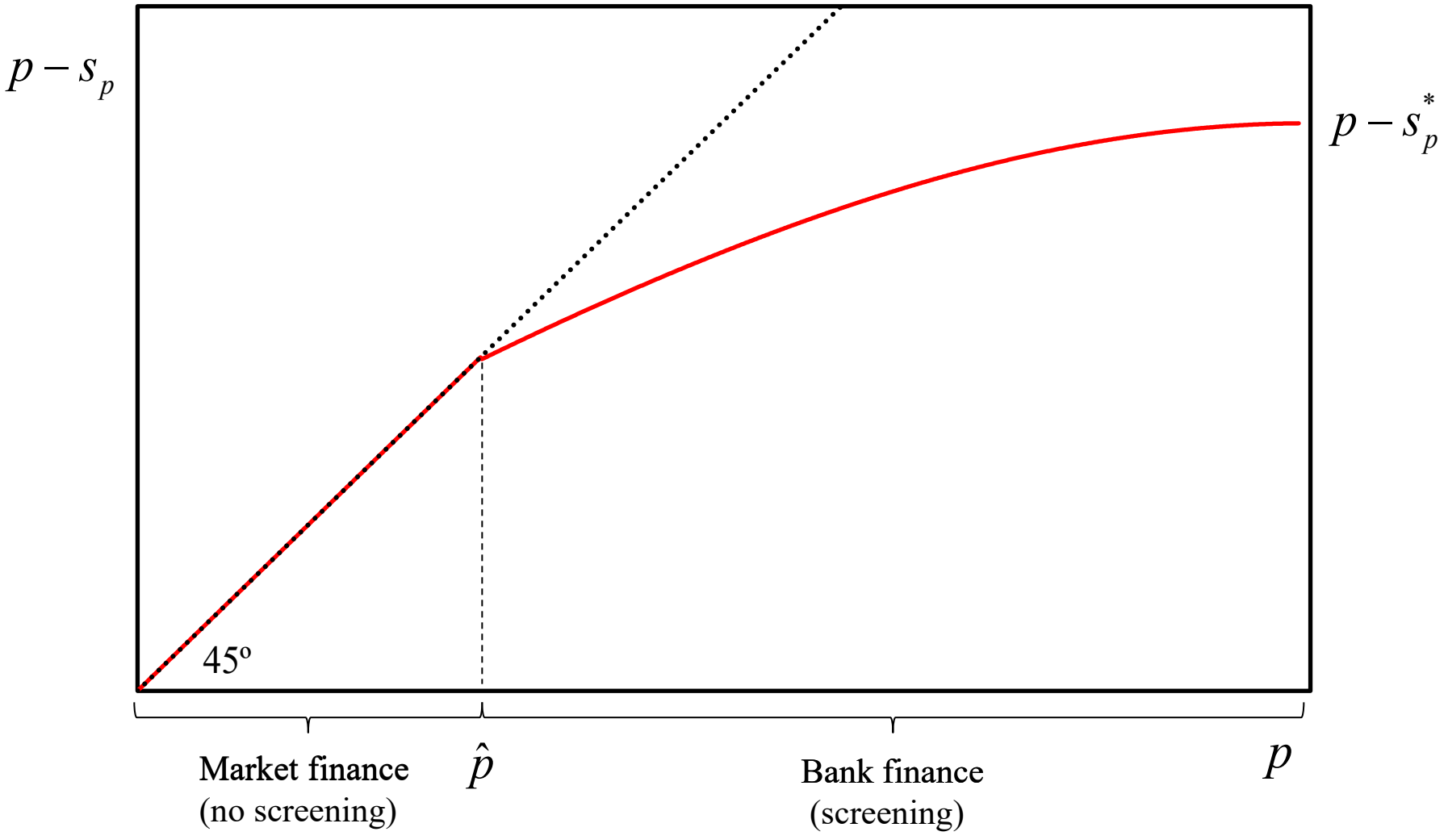
Bank capital



Borrowing and lending rates



Probability of default (PD)



Introduce underpriced deposit insurance

- Effect of underpriced (zero premium) deposit insurance

  → Borrowing rate equals safe rate for all p

  → Loan rate equals safe rate for all p

  → No capital or screening in equilibrium

  → Increase in entrepreneurs' probability of default

Introduce underpriced deposit insurance

- Effect of underpriced (zero premium) deposit insurance
  - → Borrowing rate equals safe rate for all p
  - → Loan rate equals safe rate for all p
  - → No capital or screening in equilibrium
  - → Increase in entrepreneurs' probability of default
- Effect of introducing fairly-priced deposit insurance
  - → No change in the *laissez-faire* equilibrium
  - → Fairly priced deposit insurance is not a carrot
  - → Cost of financing is not affected

Equilibrium without deposit insurance

- An equilibrium is array $(k_p^*, B_p^*, R_p^*, s_p^*)$ that solves

$$\min R_p$$

→ subject to incentive compatibility constraint

$$s_p^* = \arg\max_s \left\{(1-p+s)[R_p^* - (1-k_p^*)B_p^*] - c(s)\right\}$$

→ debtholders' participation constraint

$$(1-p+s_p^*)B_p^* \geq 1$$

→ and shareholders' participation constraint

$$\pi_p^* \geq (1+\delta)k_p^*$$

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→ debtholders' participation constraint

$$B_p^* \geq 1$$

→ and shareholders' participation constraint

$$\pi_p^* \geq (1+\delta)k_p^*$$

Equilibrium

- The equilibrium with deposit insurance is characterized by

  $\rightarrow R_p^* = B_p^* = 1$

  $\rightarrow k_p^* = 0$

  $\rightarrow s_p^* = 0$

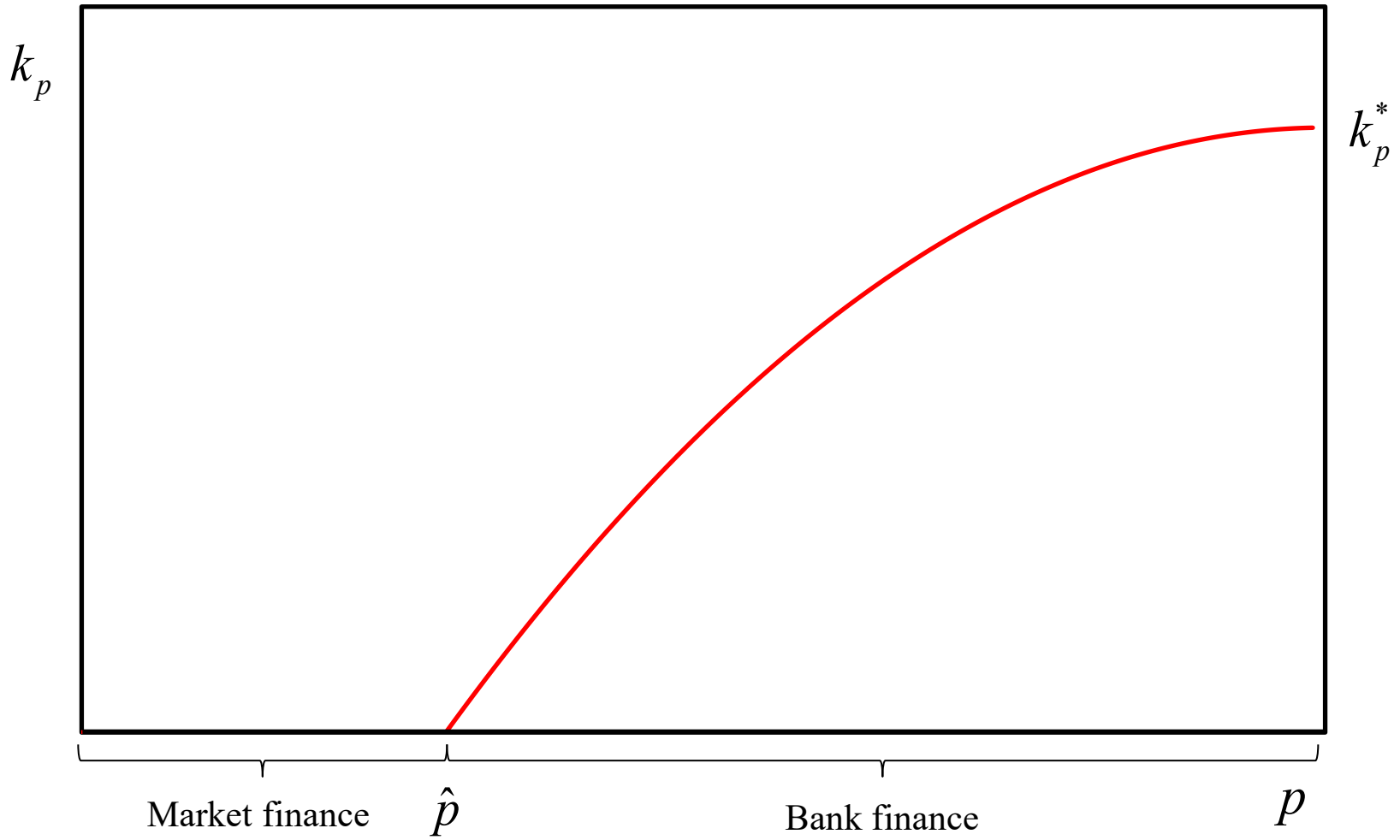
- Deposit insurance (on its own) is bad

  → Increases risk-taking (no screening in equilibrium)

  → And also generates overinvestment

  → Can be shown to reduce welfare

Bank capital



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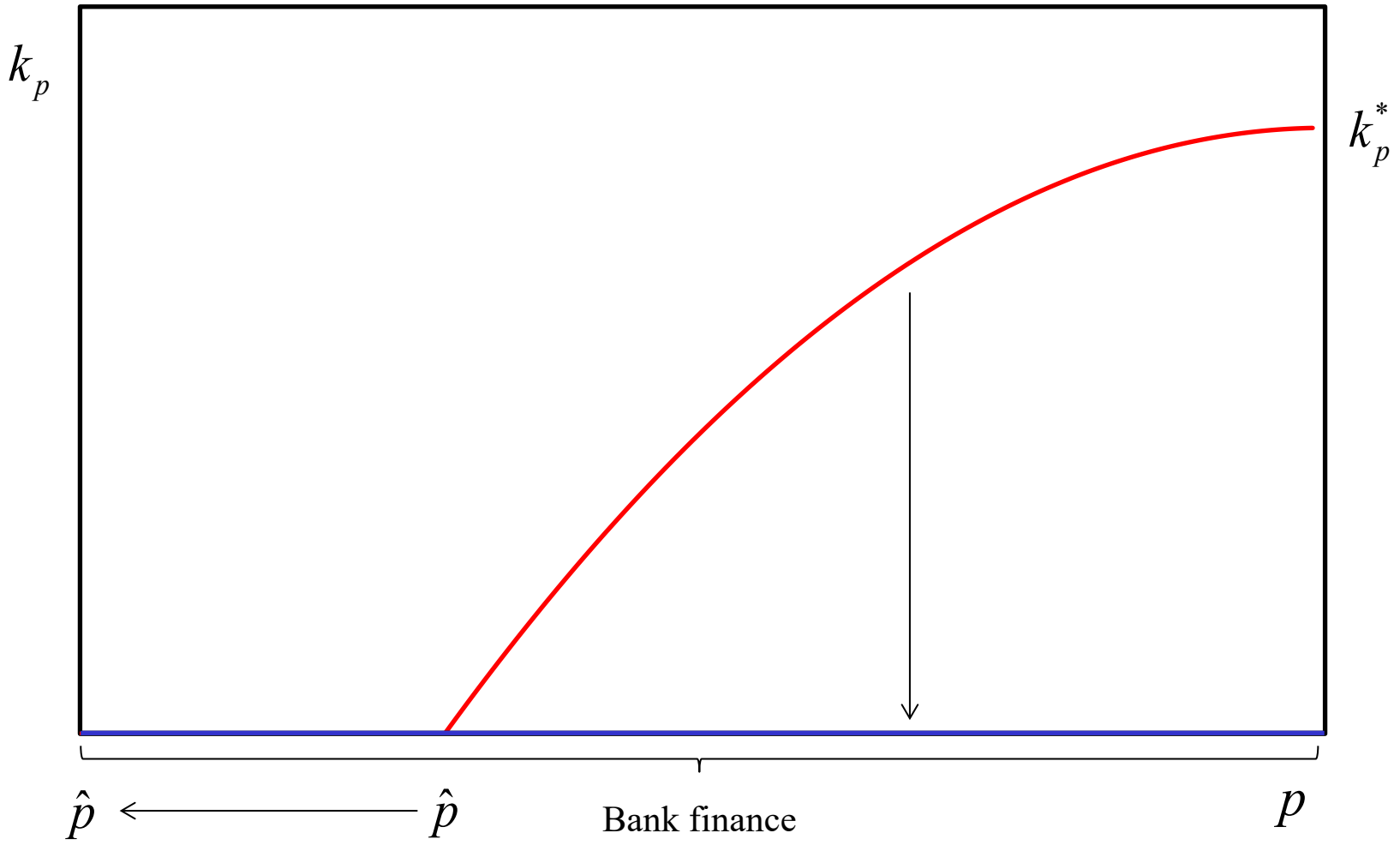

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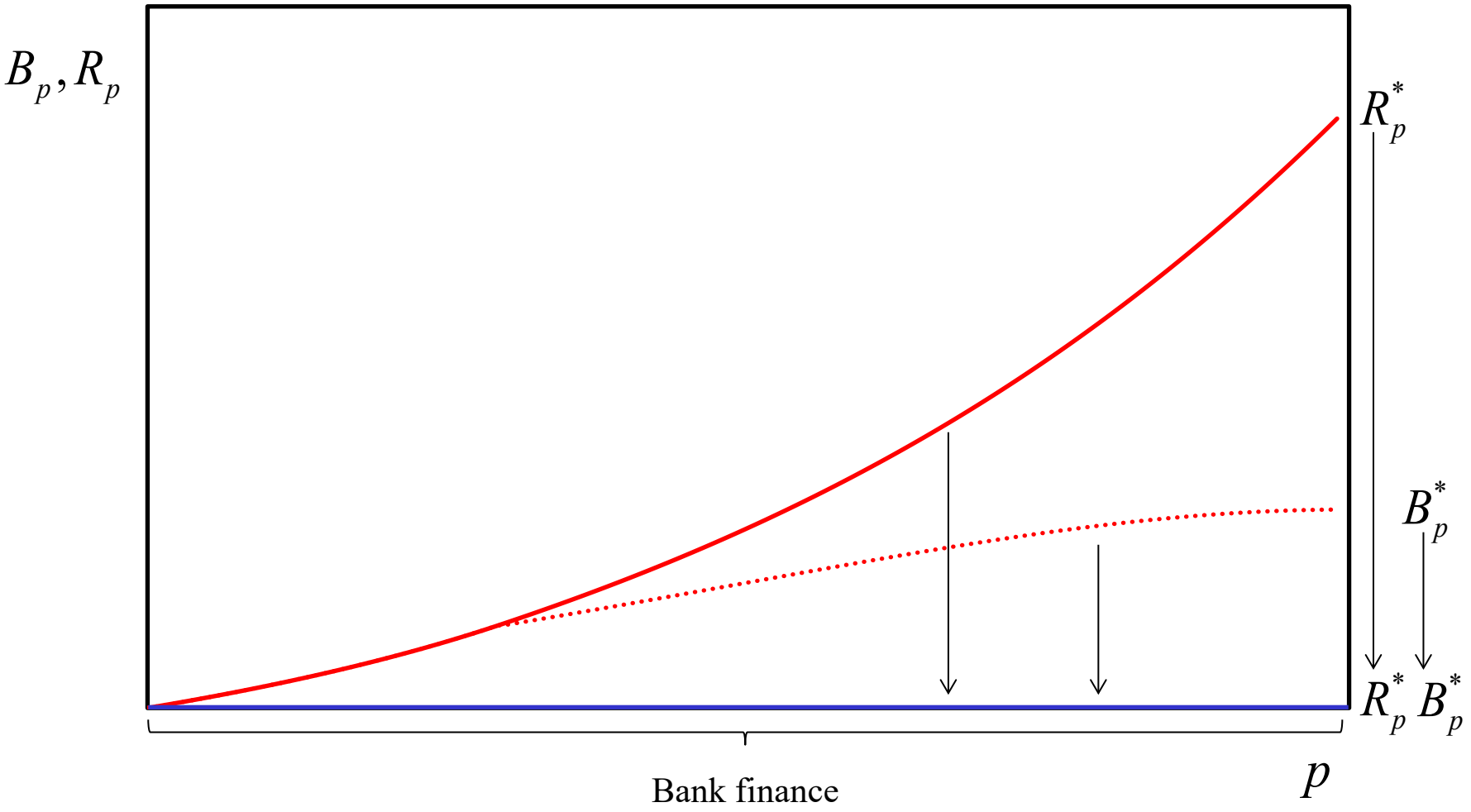

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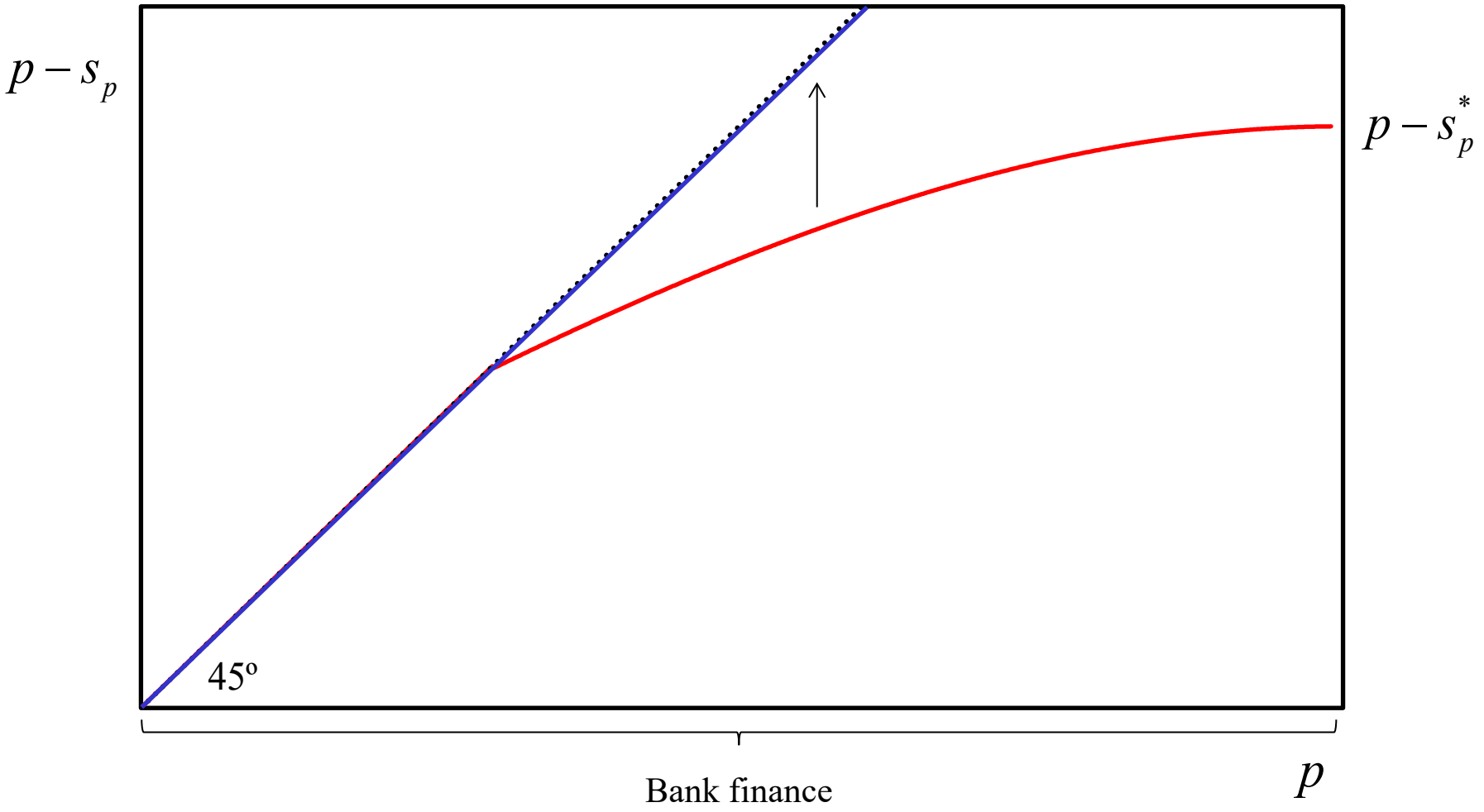


Benefits of deposit insurance

- Deposit insurance more valuable for riskier banks (high p)

  → In laissez faire high p → high $p - s_p$

Part 2b

Flat capital requirements

Flat capital requirements

- Flat requirement (Basel I) or leverage ratio (Basel III)

$$k_p \geq \overline{k}$$

Flat capital requirements

- Flat requirement (Basel I) or leverage ratio (Basel III)

$$k_p \geq \overline{k}$$

- Complying with regulation implies underpriced deposit insurance
- Not complying with regulation implies no deposit insurance

  → Higher cost of debt for unregulated finance

  → Both for direct market finance and shadow banks

Flat capital requirements + dep. insurance

- Capital requirements are a cost for the bank (stick)

  → Recall positive cost of equity

- For capital requirements to be effective (binding)

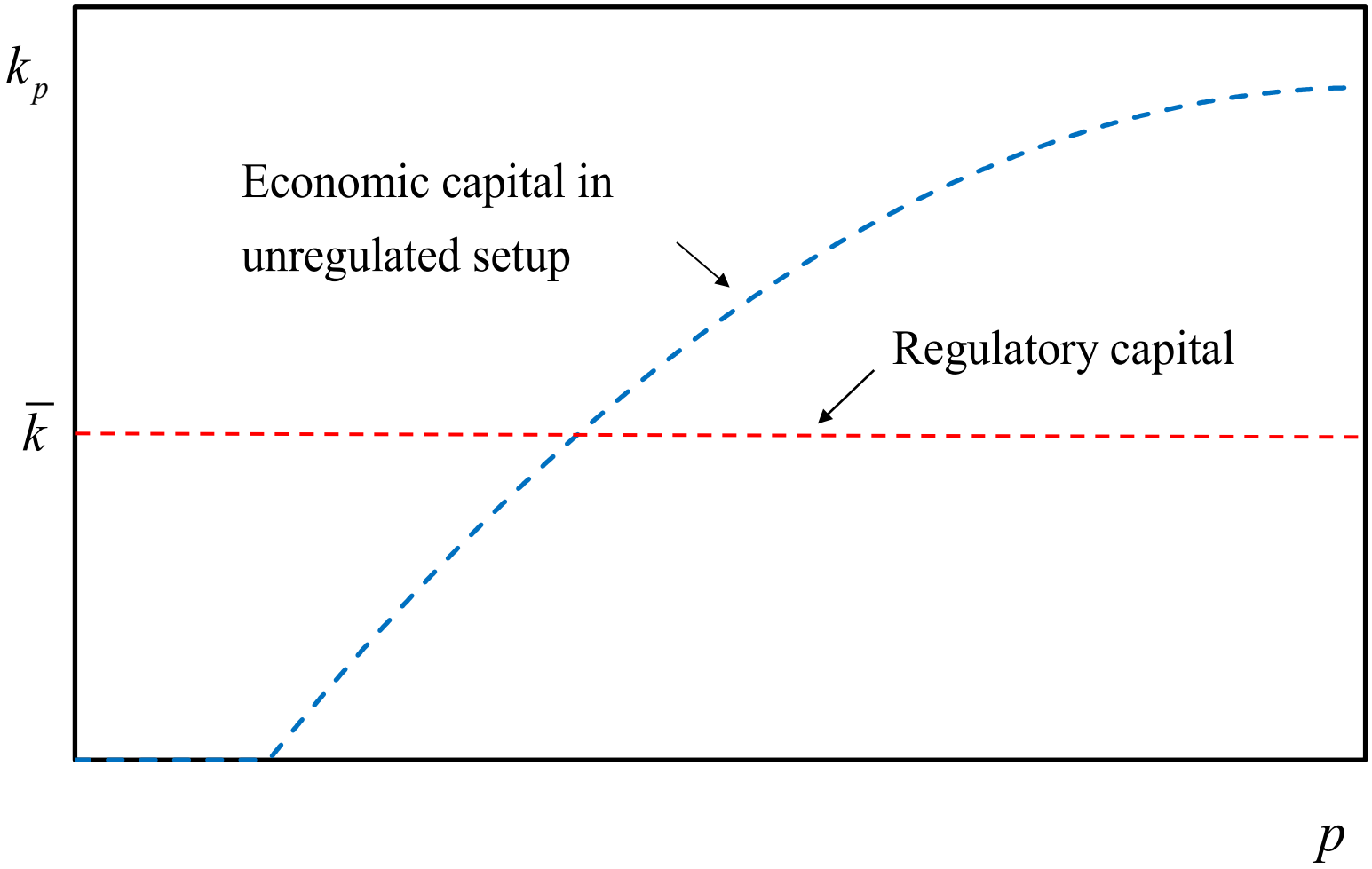
  → They need to come with some benefits

  → Access to deposit insurance is the carrot

  → If not, affected banks would become shadow banks

  → In which case regulation is useless

Capital with flat requirements



Two cases: low and high flat requirements

- With low flat requirements

  → Only direct market finance and regulated banks

  → No role for shadow banks

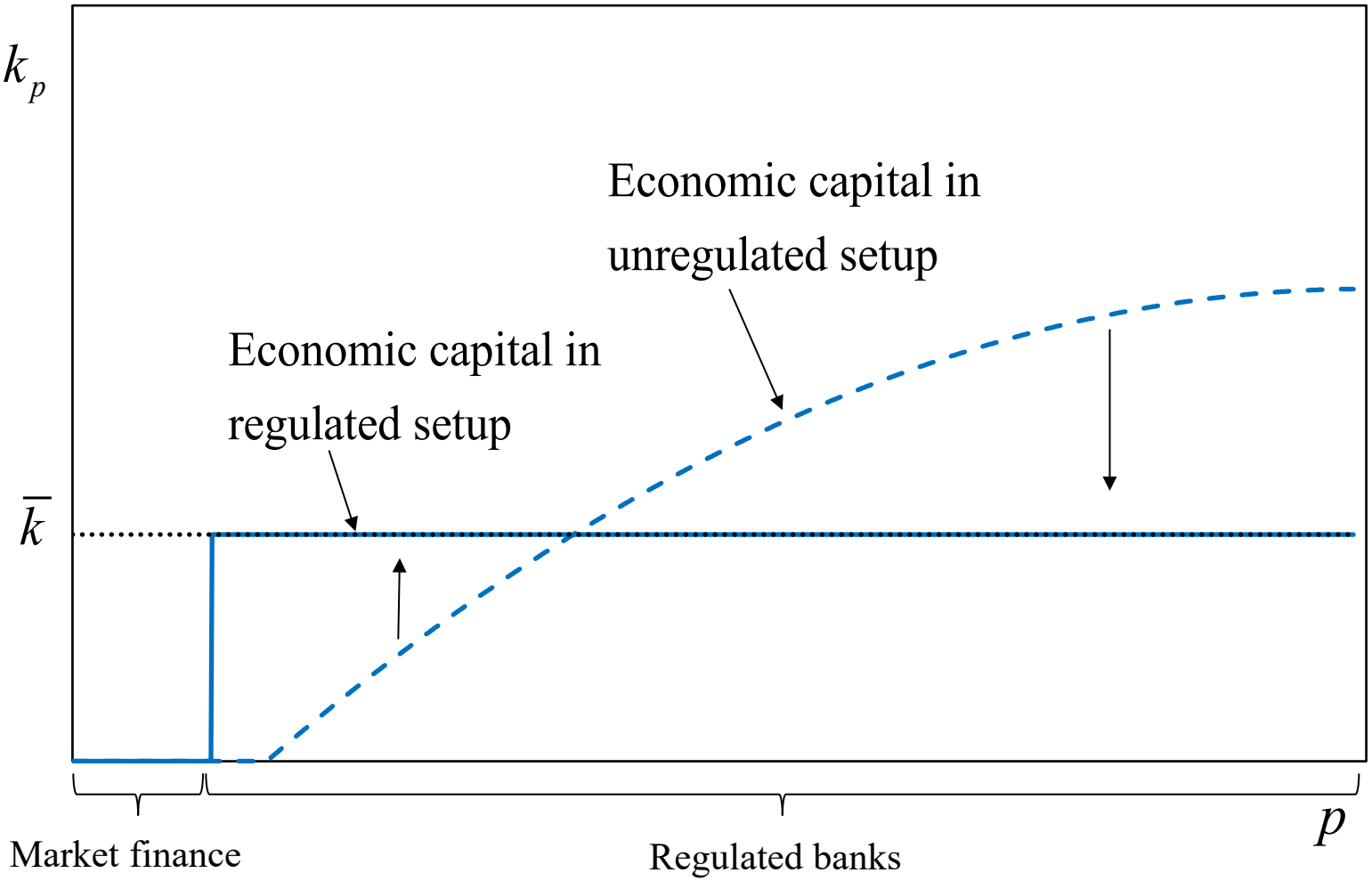
- With high flat requirements

  → Shadow banks can profitably enter the market

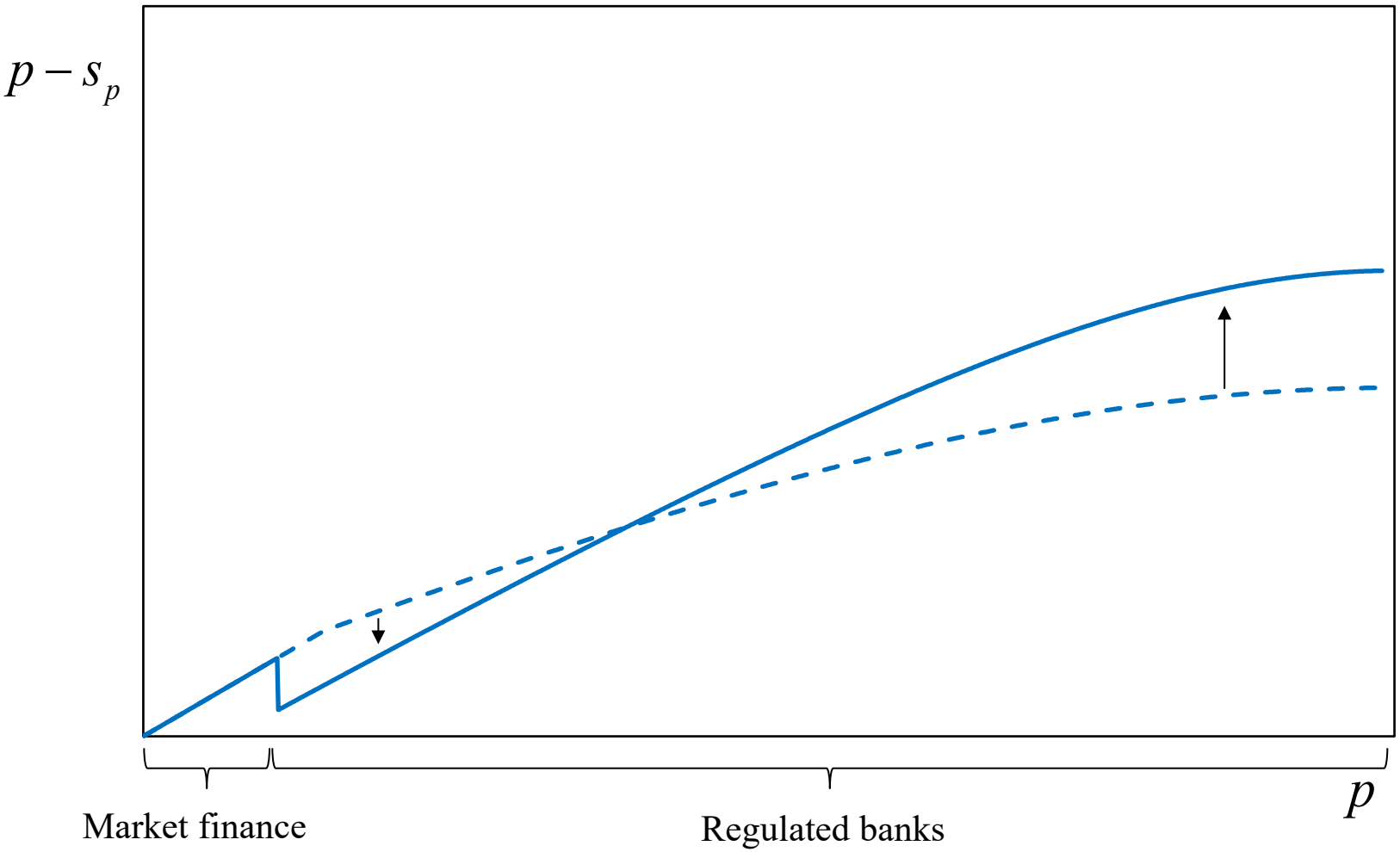
  → To fund medium-risk projects

  → Taking over part of the regulated banks' market

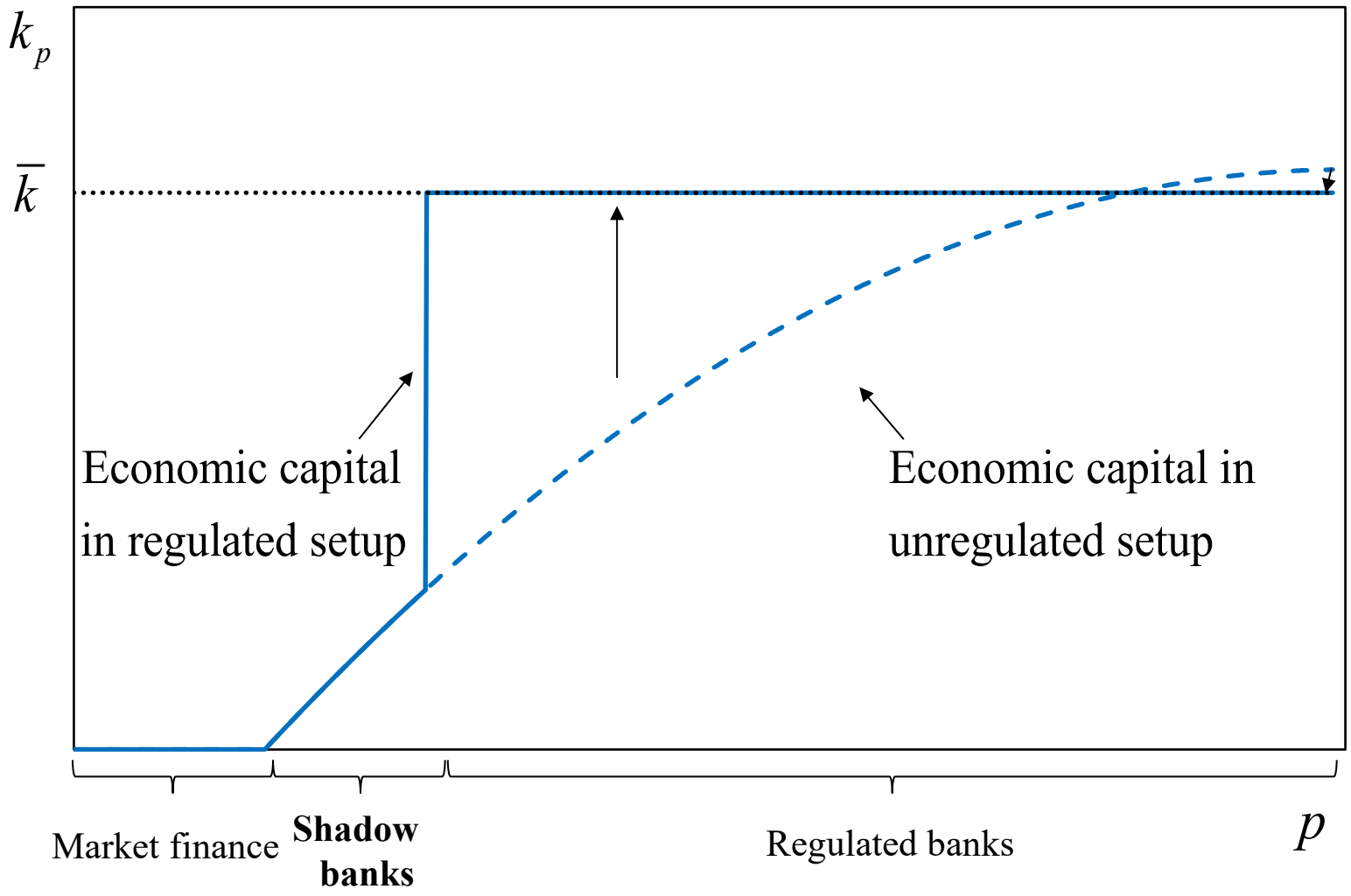
Capital with low flat requirements



PD with low flat requirements



Capital with high flat requirements



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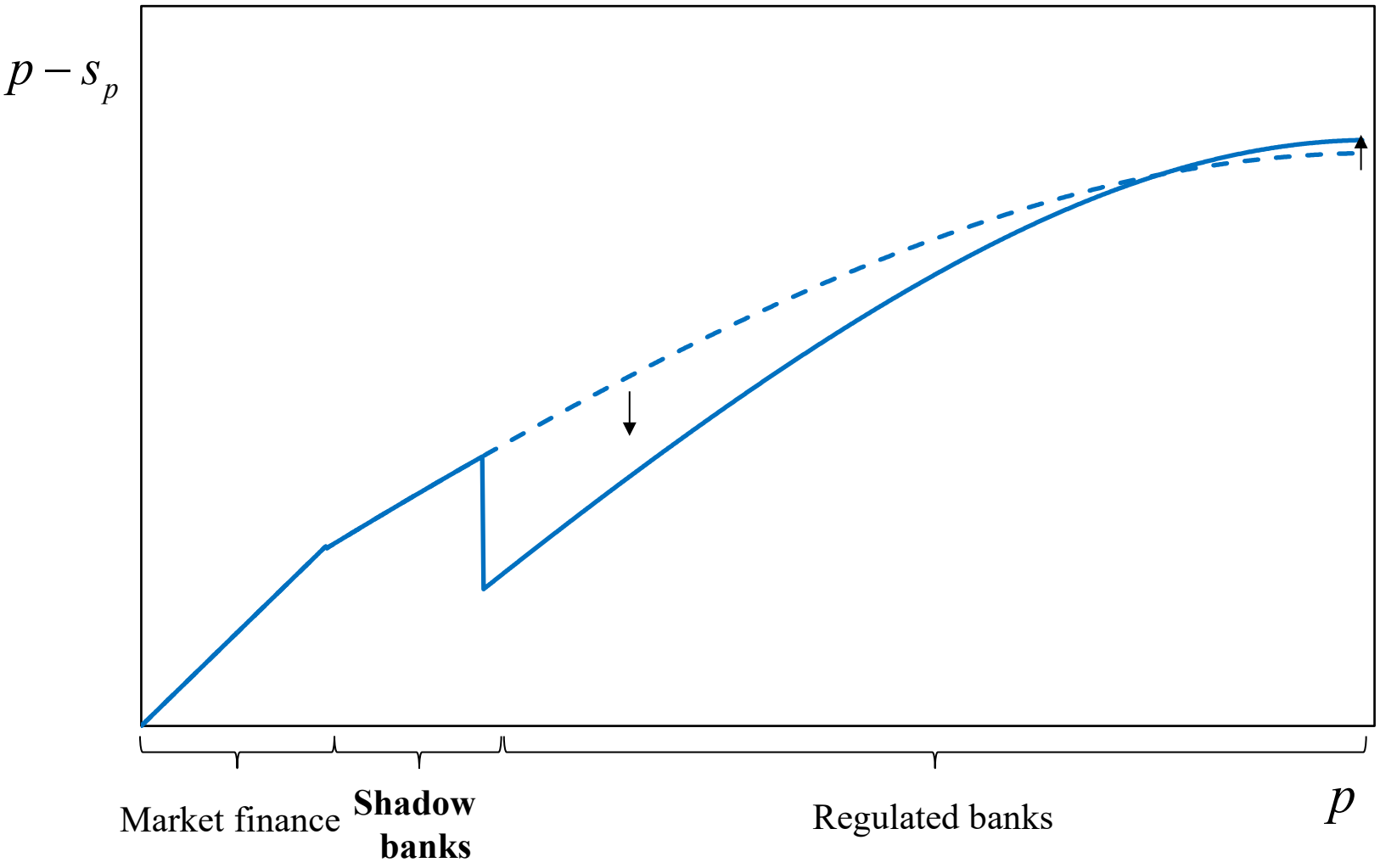
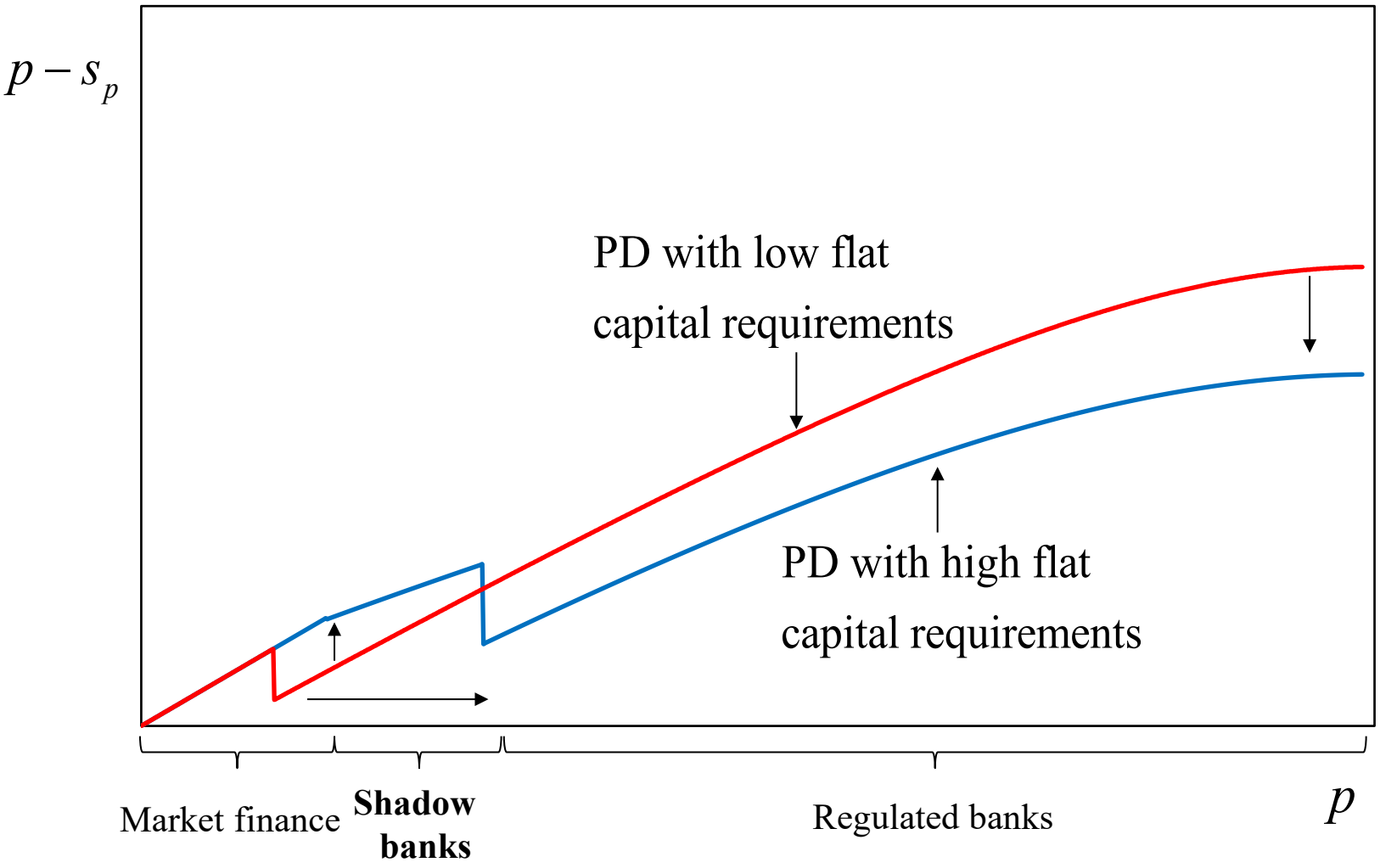


PD from low to high flat requirements



Effect of introducing flat capital requirements + deposit insurance

- Makes risky assets more prone to be funded by regulated banks

  → Benefit of deposit insurance is higher

  → Unregulated finance (shadow or market) fund low risk

- Decreases or increases risk w.r.t. laissez-faire

  → For intermediate p it decreases risk

  → For high p it increases risk

- Deposit insurance can decrease risk (with capital requirements)

  → Capital requirements on their own are useless

Effect of tightening flat capital requirements

- Drives safer borrowers away from regulated banks

  → Lower screening and higher risk

  → Riskier (unregulated) financial system

- Regulated banks (that stay being so) become safer

  → Higher capital increases screening incentives

  → Safer (regulated) financial system

  → Only for riskier borrowers

- Different intensive (safer) and extensive (riskier) effects

Part 2c

Value-at-Risk based capital requirements

VaR capital requirements (i)

- Introducing a VaR-based capital requirement (à la Basel II)

  → In Basel II

$$\Pr(\text{loan losses} \geq \bar{k}_p) = \alpha$$

  where $1 - \alpha$ is confidence level (e.g. 99.9%)

  → In our setup this is equivalent to

$$\Pr(\text{loan default} \mid \bar{k}_p) = \alpha$$

VaR capital requirements (ii)

- To ensure

$$\Pr(\text{loan default} \mid \bar{k}_p) = \alpha$$

→ we require $\bar{k}_p$ to be such that $p - s_p = \alpha$

- Model then gives closed-form capital requirements formula

$$\bar{k}_p = f(p, \alpha)$$

→ Increasing in risk p

→ Increasing in confidence level $1 - \alpha$

VaR capital requirements (iii)

- Three equations

  → FOC: $R-(1-k)B=c'(s)$

  → DPC: $B=1$

  → SPC: $(1-p+s)[R-(1-k)B]-c(s)=(1+\delta)k$

- FOC + DPC imply: $R=1-k+c'(s)$
- Using SPC we get

$$(1+\delta)k=(1-p+s)c'(s)-c(s)$$

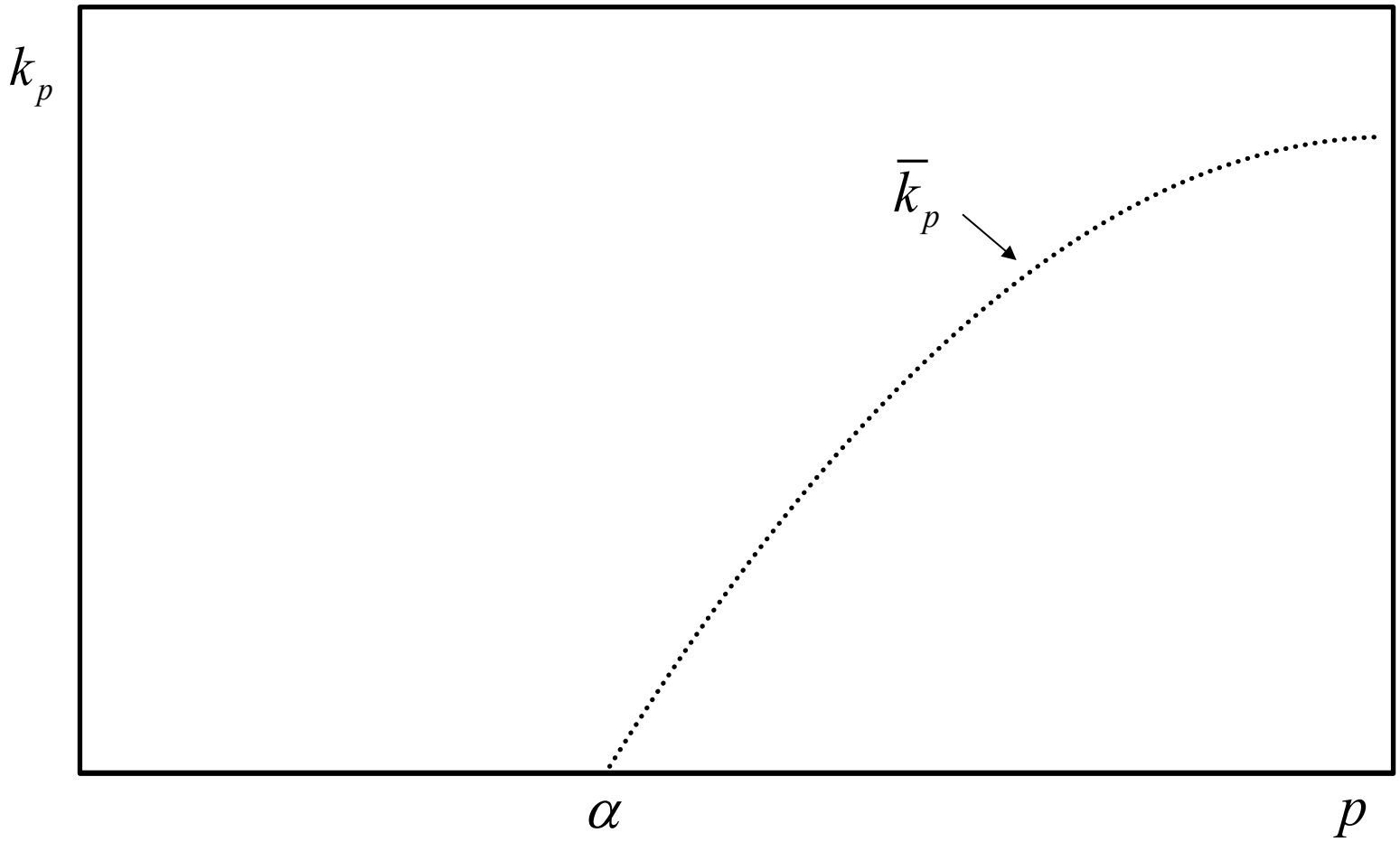
VaR capital requirements (iv)

- The capital requirement k must be such that $p - s = \alpha$

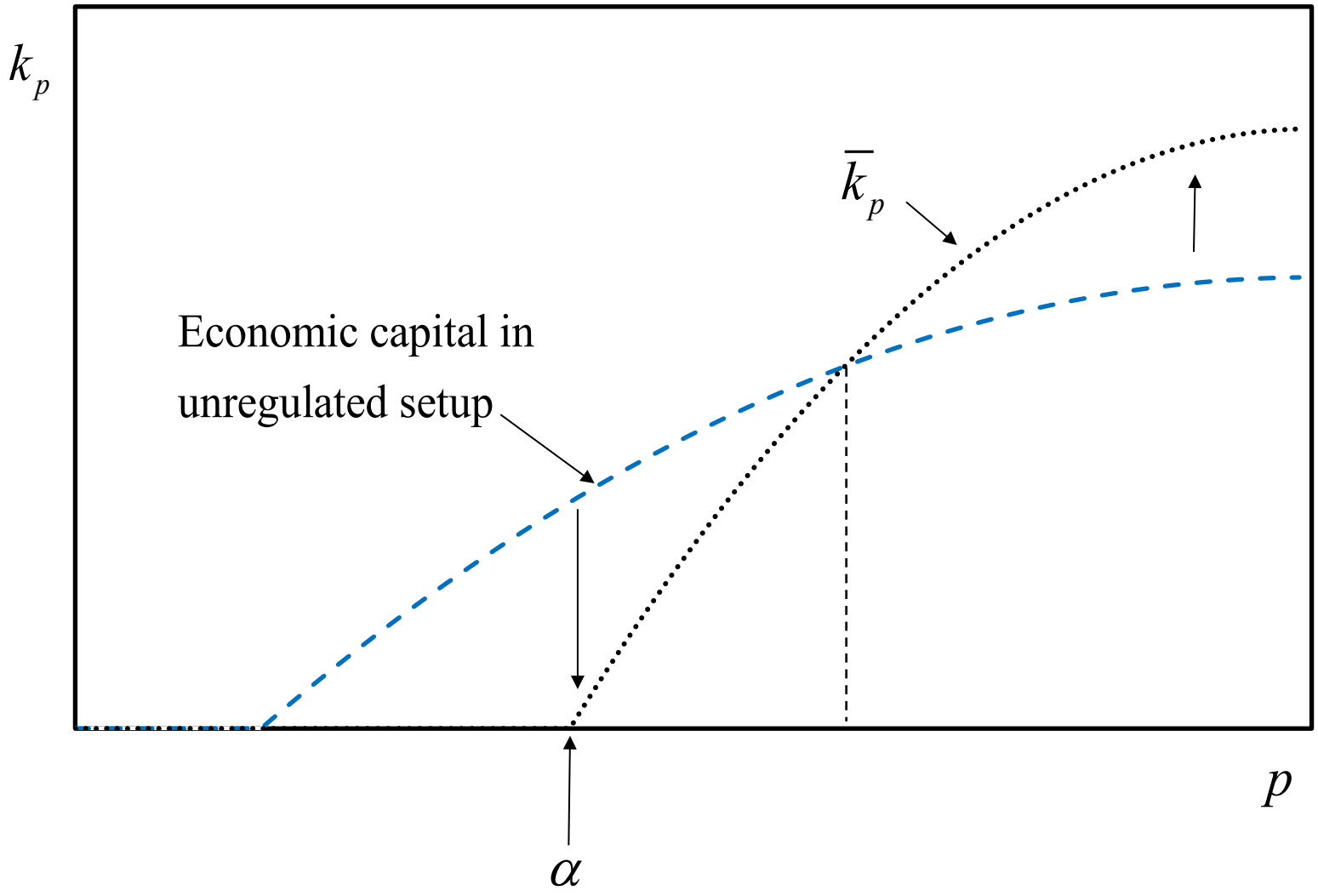
  $\rightarrow$ which gives the following capital requirements formula

$$f(p,\alpha) = \frac{(1-\alpha)c'(p-\alpha) - c(p-\alpha)}{1+\delta}$$

VaR capital requirements



Capital with VaR requirements



Two cases: low and high VaR requirements

- With low VaR requirements

  → Only regulated banks

  → No role for shadow banks

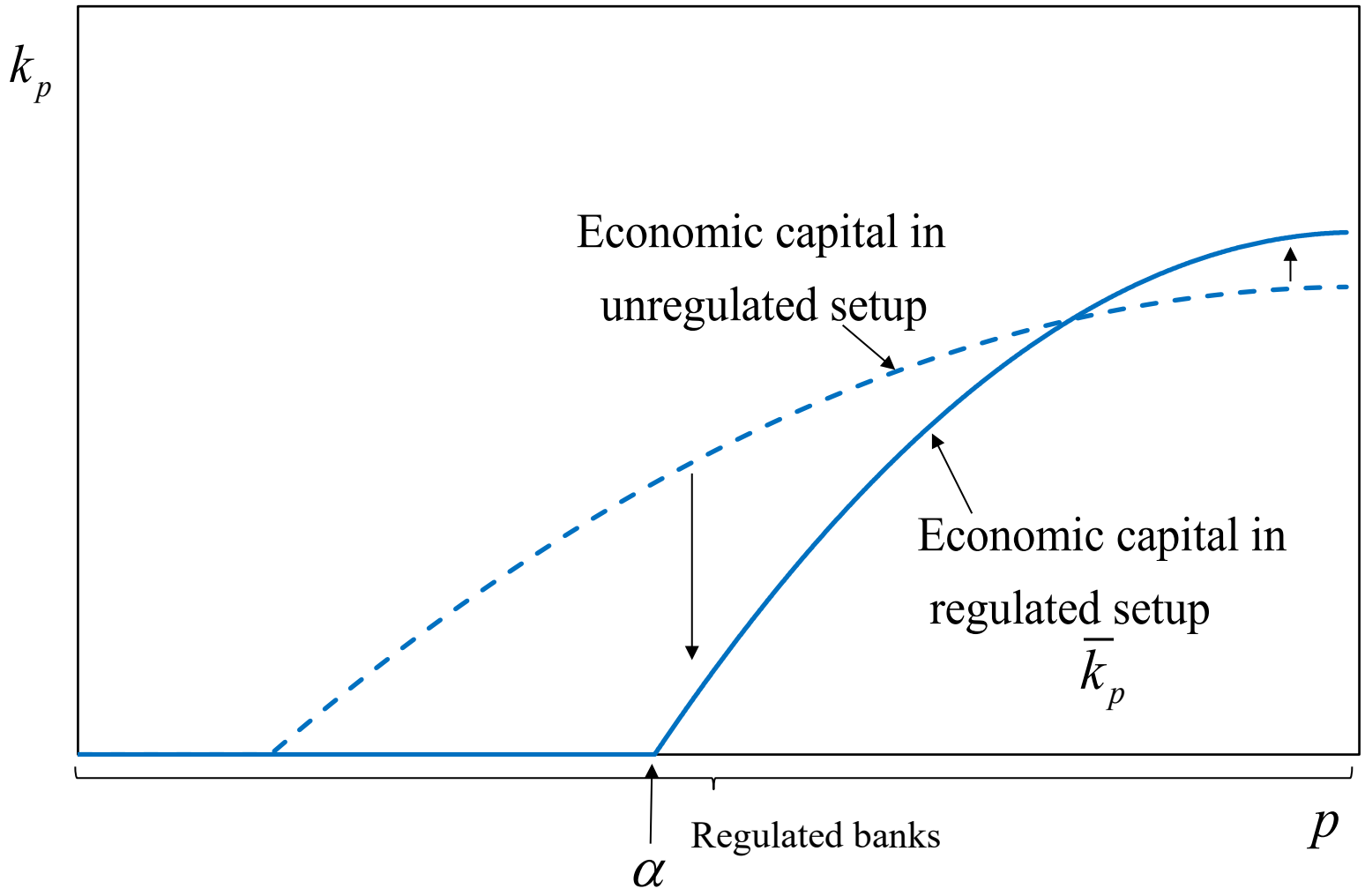
- With high VaR requirements

  → Shadow banks can profitably enter the market

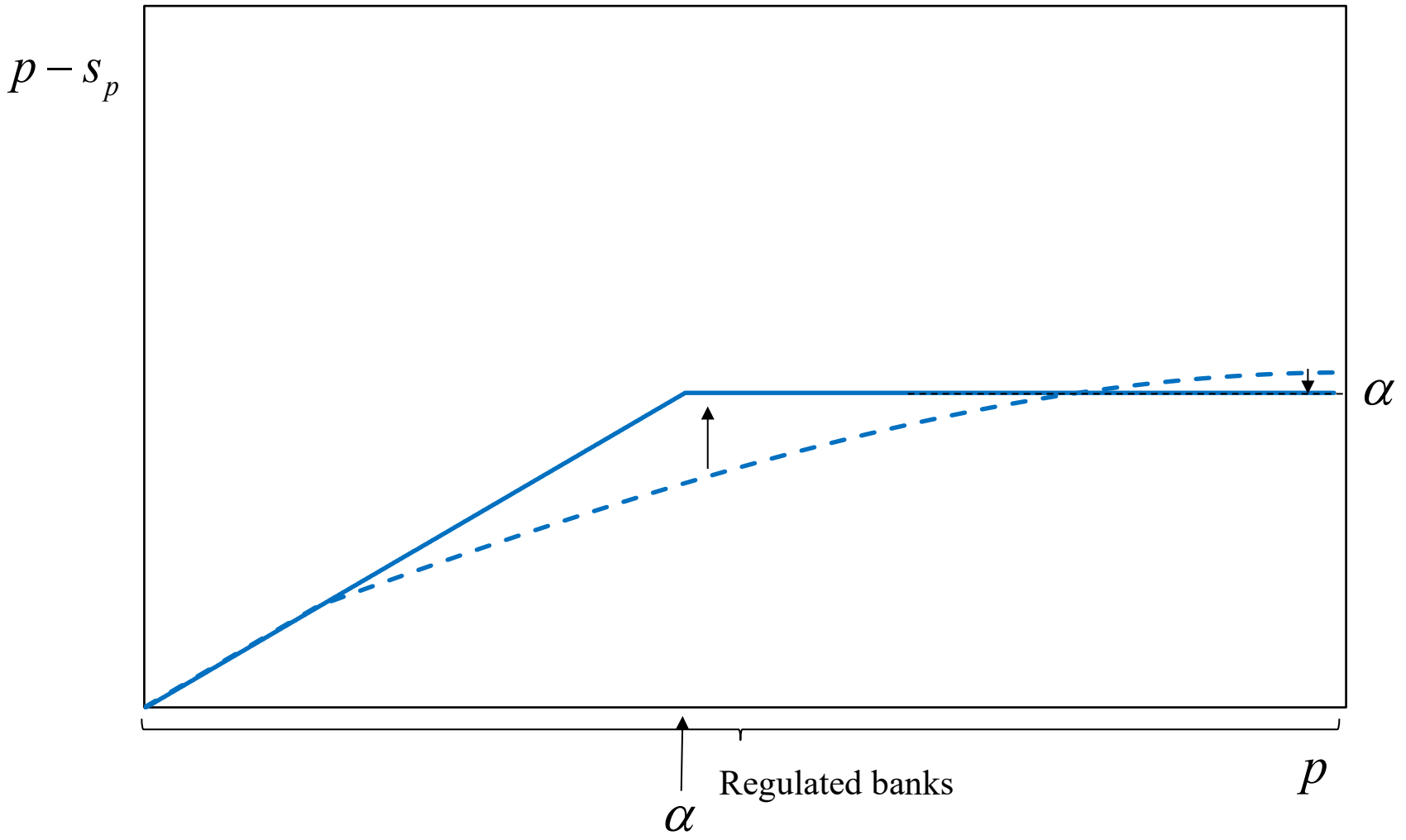
  → To fund high-risk projects

  → Taking over part of the regulated banks' market

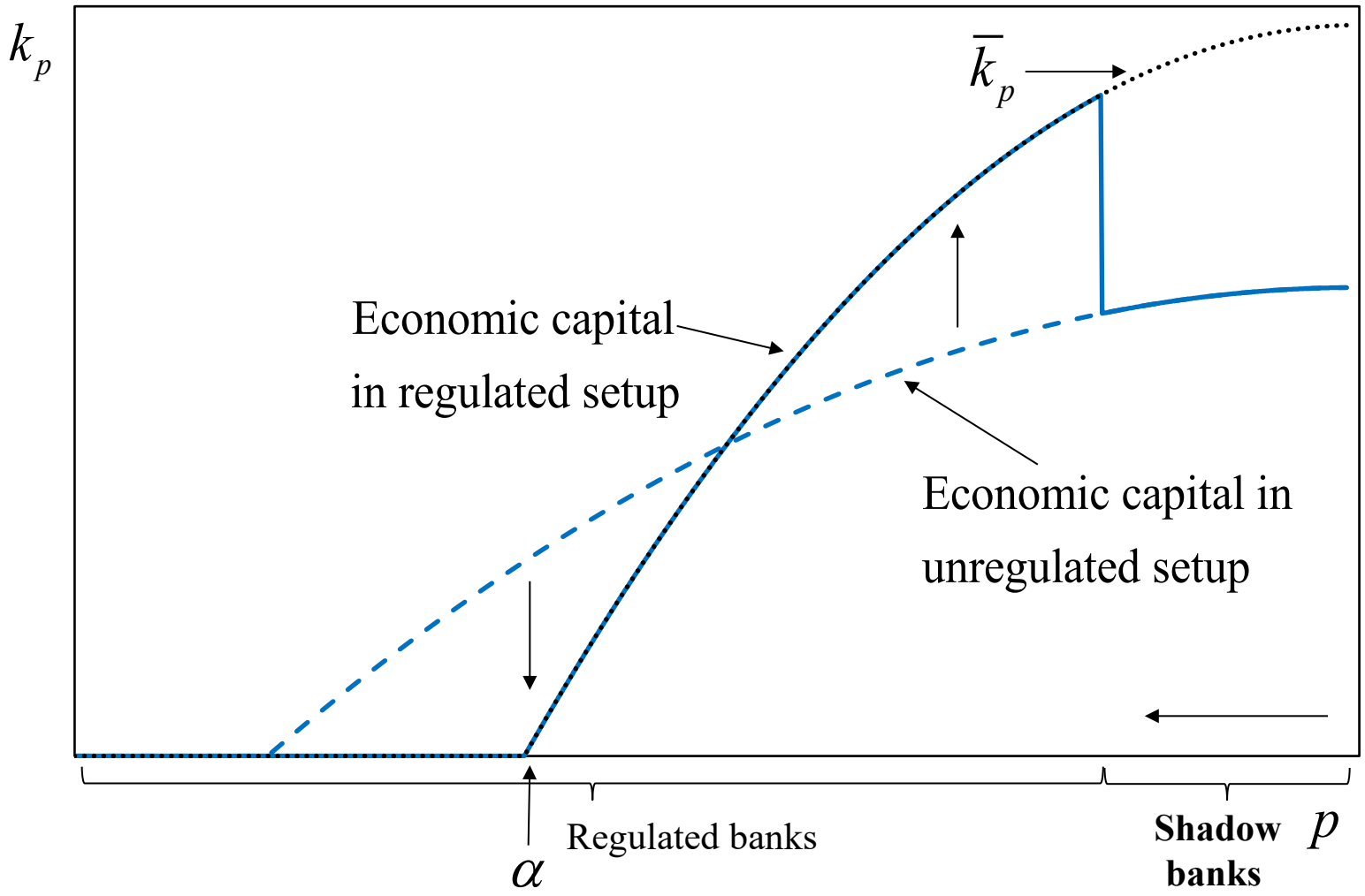
Capital with low VaR requirements



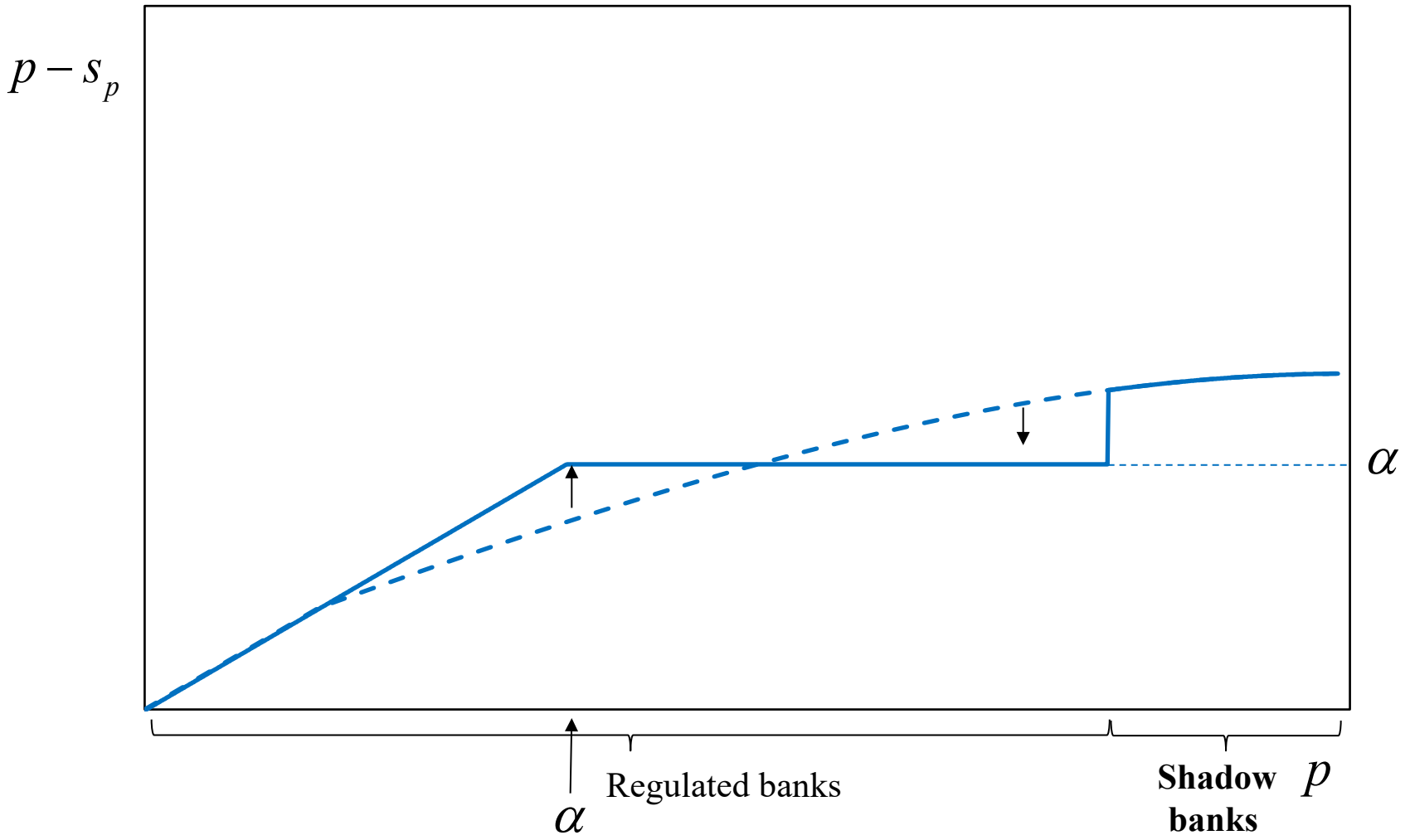
PD with low VaR requirements



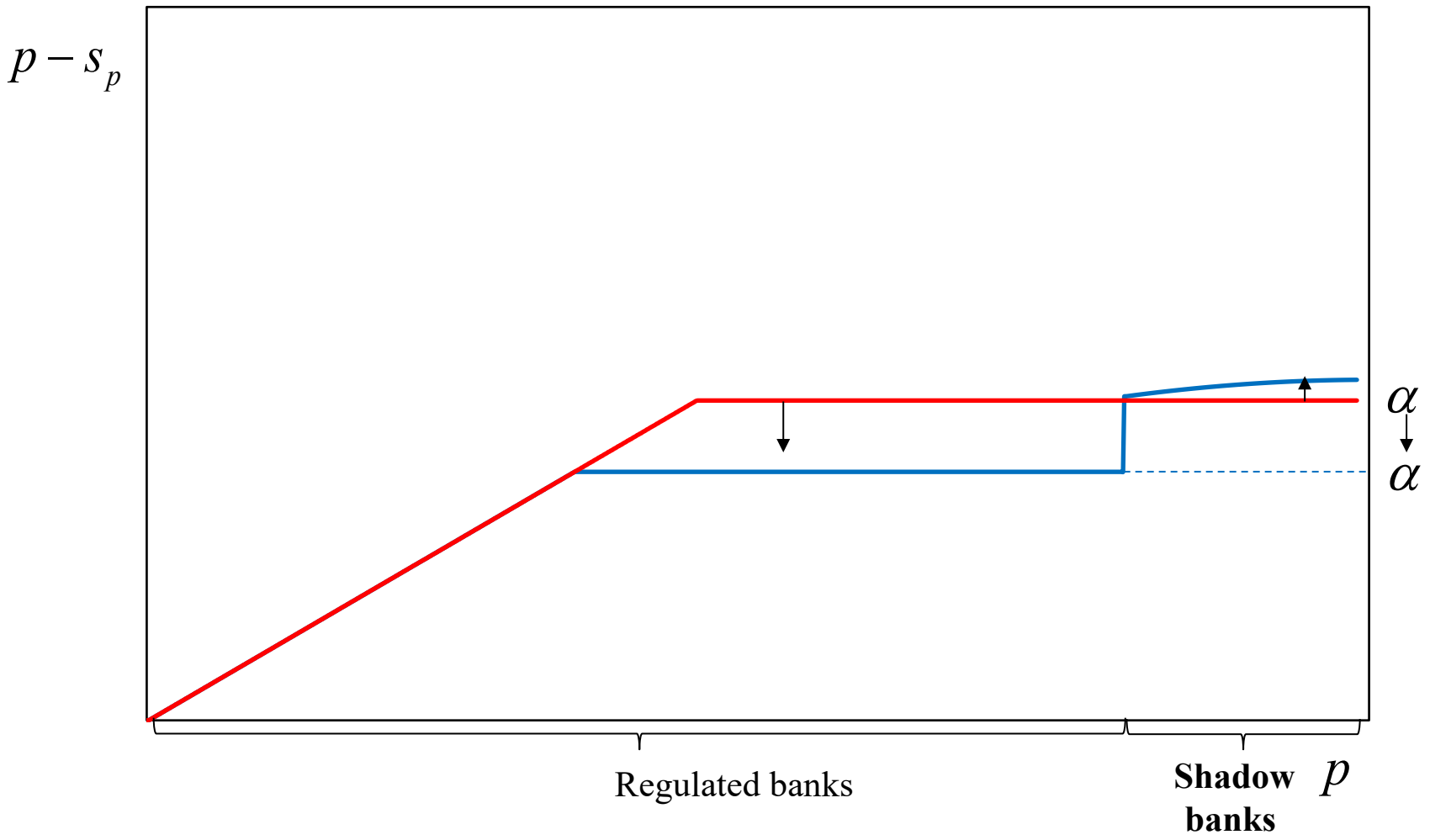
Capital with high VaR requirements



PD with high VaR requirements



PD from low to high VaR requirements



Effect of introducing VaR capital requirements + dep. insurance

- Makes safe assets more prone to be hold by regulated banks

  → Costs of capital is lower

  → Unregulated finance (shadow or market) hold high risk

- Decreases or increases risk w.r.t. laissez-faire

  → For low p it increases risk

  → For high p it decreases risk

- Deposit insurance can decrease risk (with capital requirements)

  → Capital requirements on their own are useless

Effect of tightening VaR requirements

- Drives risky borrowers away from regulated banks

  → Lower screening and higher risk

  → Riskier (unregulated) financial system

- Medium-risk regulated banks become safer

  → Higher capital increases screening incentives

  → Safer (regulated) financial system

- No effect on low-risk regulated banks

- Intensive effects (safer) different from extensive (riskier)

Part 3

Optimal capital requirements

Part 3.a

Constrained inefficiency of laissez-faire

Social welfare function (i)

- Investors receive opportunity cost of their funds

  → Participation constraints are satisfied with equality

- Entrepreneurs borrow at rates that leaves them no surplus

  → By assumption of free entry

- Banks profits are equal to zero

  → By assumption of perfect competition

- Social welfare comes from output produced by entrepreneurs

  → Introduce representative consumer

Consumers' surplus (i)

- Representative consumer

  → Utility function over goods produced all types p

- Unit investment produces unit output (if successful)

  → Output of safe entrepreneurs $p = 0$

$$y_0 = x_0$$

  → Output of risky entrepreneurs $p > 0$

$$y_p = \begin{cases} x_p & \text{with prob. } 1 - p + s_p \\ 0 & \text{with prob. } p - s_p \end{cases}$$

Social welfare function (ii)

- Utility function of representative consumer

$$U(q,x) = q + \frac{\sigma}{\sigma - 1}\int_0^1 (y_p)^{\frac{\sigma-1}{\sigma}}\, dp$$

$\rightarrow q$ is consumption of composite good

$\rightarrow y_p$ is output of entrepreneurs of type p

$\rightarrow \sigma > 1$

Social welfare function (iii)

- Budget constraint of representative consumer

$$q + \int_0^1 A_p x_p \; dp = I$$

→ A_p is unit price of goods produced by type p

→ I is consumer's income

Social welfare function (iv)

- Maximizing the utility subject to the budget constraint gives

$$A_p = (x_p)^{-1/\sigma}$$

- Substituting this result into the utility function gives SWF

$$W(x) = I + \frac{1}{\sigma - 1}\int_0^1 (1 - p + s_p)(x_p)^{\frac{\sigma-1}{\sigma}}\, dp$$

→ Taking into account that x_p obtains with prob. $1 - p + s_p$

Constrained inefficiency of equilibrium

- Consider a social planner that maximizes social welfare

  → subject to same moral hazard problem as the banks

- Social planner would reduce investment in risky firms

  → Laissez-faire equilibrium is inefficient

- Intuition: Competition leads to too low intermediation margins

  → Social planner's optimal allocation widens margins

  → Lower risk-taking and higher welfare

Part 3.b

Optimal capital requirements

Optimal capital requirements

- Unconstrained optimal capital requirements

  → All activities are regulated (no unregulated finance)

- Constrained capital requirements

  → Threat of unregulated finance – can not prohibit it -

- IMPORTANT: Only focus on capital regulation

  → No regulation on entry for example or on fraction of DI

Optimal capital requirements

- Optimal capital requirements defined by

$$k^* = \arg\max_k W(x(k))$$

- Welfare can include deposit insurance costs (not today)

$$DI_p = -\lambda(p-s)(1-k)B$$

→ where λ is the social cost of public funds

→ *Toulouse* lambda

Optimal capital requirements

- Optimal capital requirements are risk-sensitive

  → But do not satisfy VaR condition

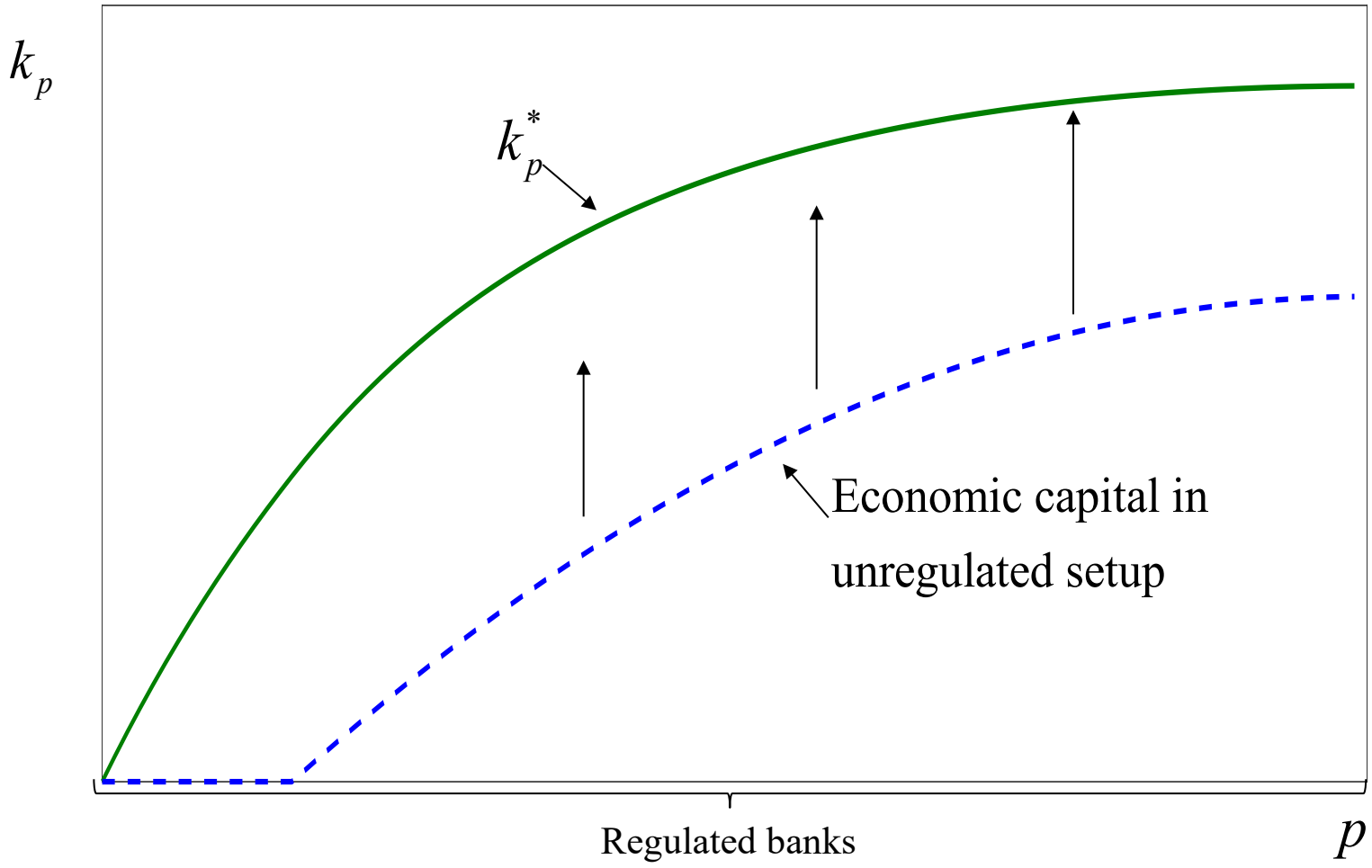
  → Lower confidence level for higher risks

  → To avoid emergence of unregulated finance

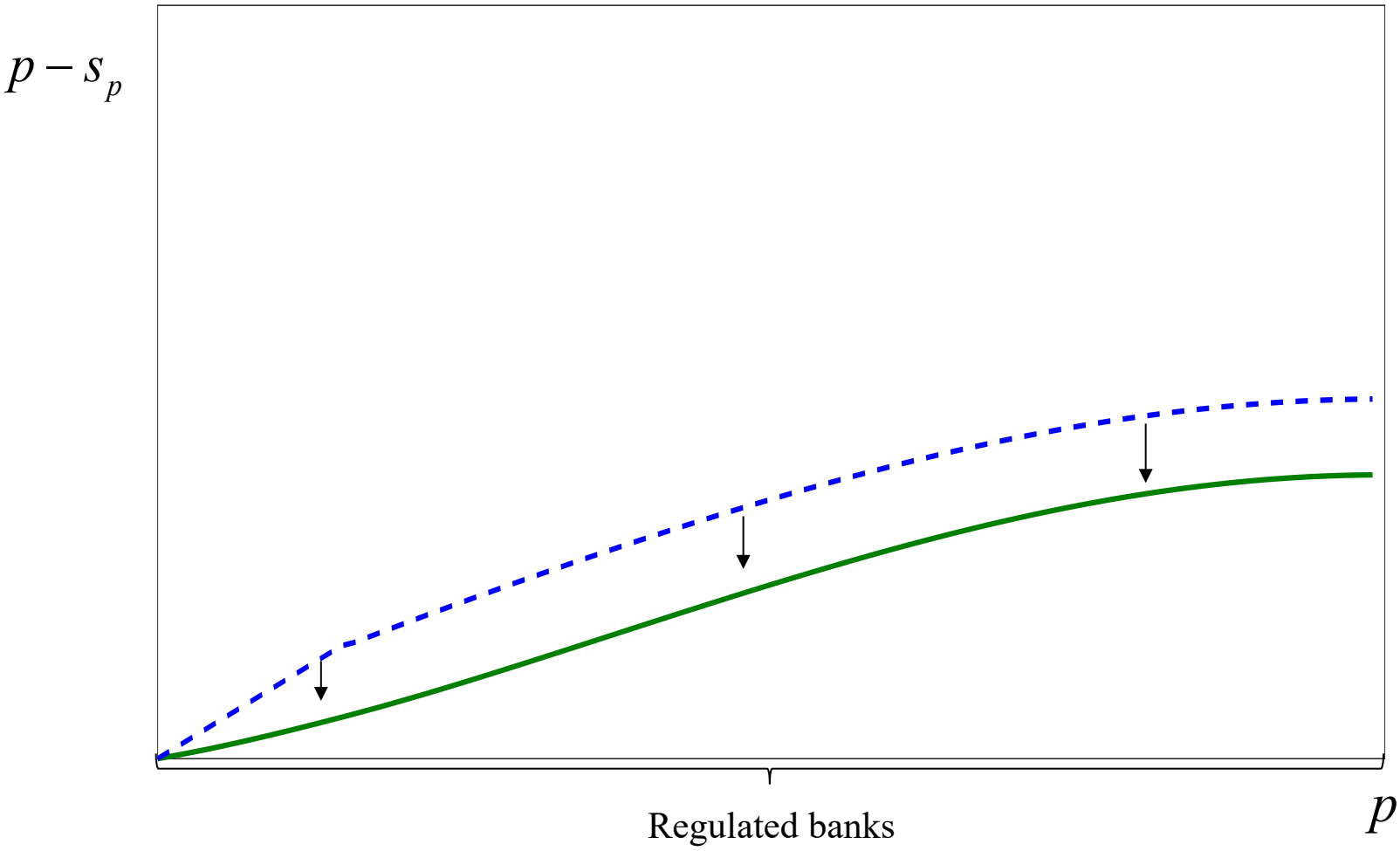
- In the absence of unregulated finance

  → Capital requirements would be stricter

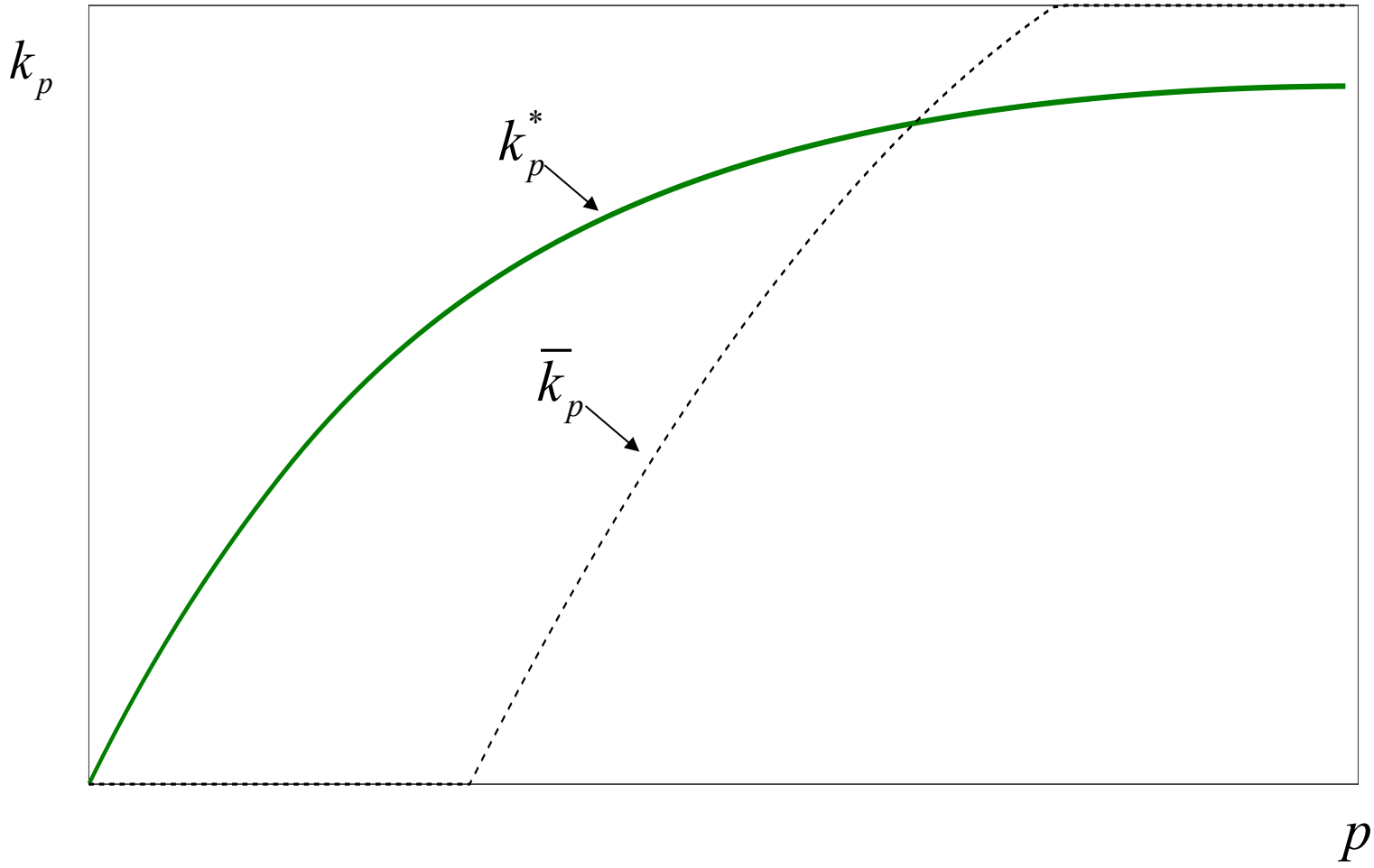
Optimal capital requirements



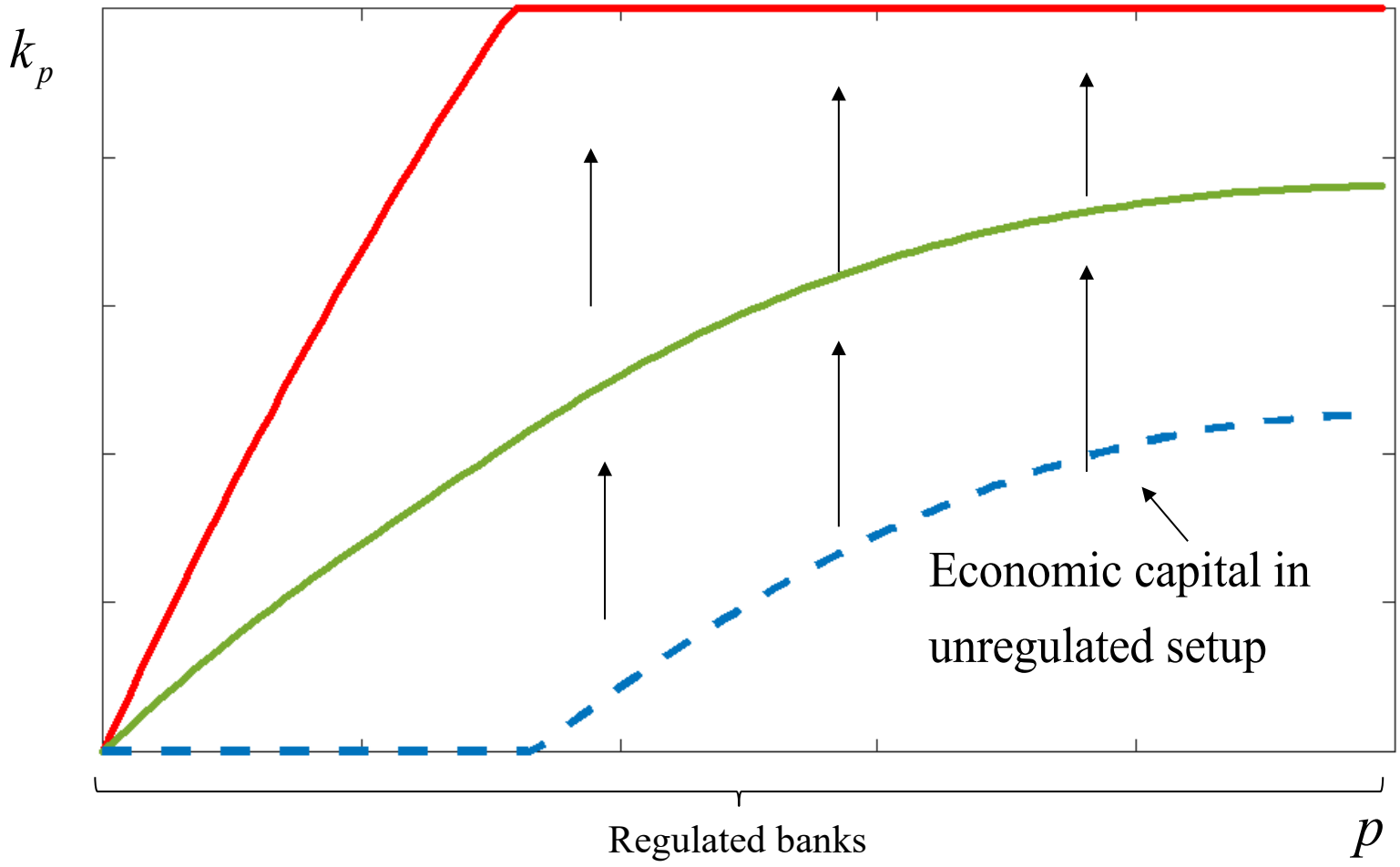
PD with optimal capital requirements



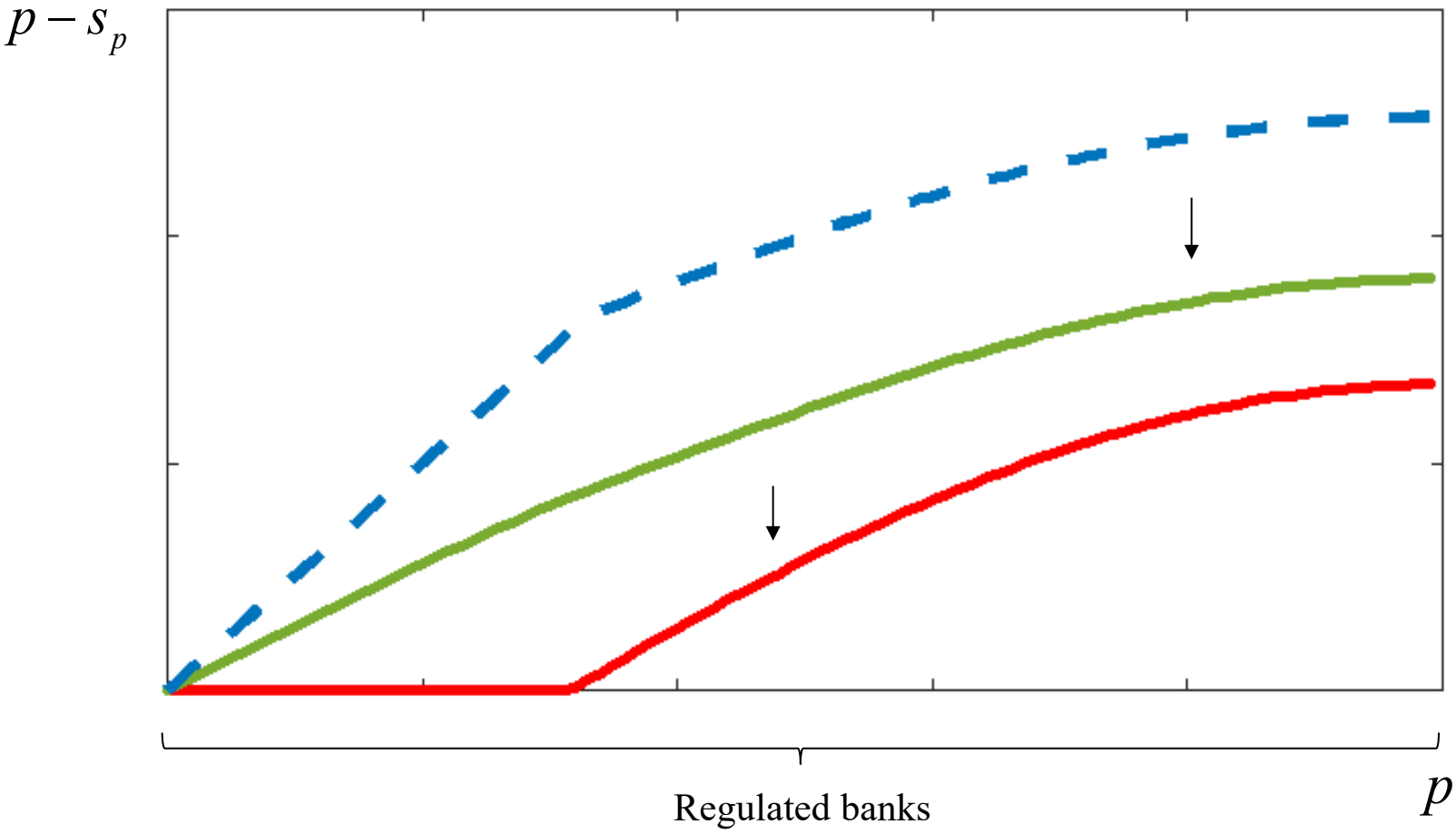
Optimal capital requirements



Optimal capital requirements w/o unregulated



PD with optimal capital requirements w/o unreg



Part 4

Extensions

Part 4a

Certification costs

Certification setup

- Novel role for supervisor

  → Certify bank equity (or investment)

- Why is there a need of certification?

  → Banks are opaque (in funding and investments)

  → Holding bank equity is expensive (fund diversion story)

- Supervisor can certify at a lower cost than market

  → Better information

  → Lower moral hazard issues (higher credibility/reputation)

  → Or same technology but does not charge the bank for it

Certification as a carrot

- If subject to regulation (regulated banks)

  → Banks pay a lower certification cost

- If not subject to regulation (unregulated finance)

  → Banks resort to (more expensive) private certification

- No analysis (need) of deposit insurance

  → Bank funding is uninsured (or fairly priced dep. insurance)

Banks' profit

- If subject to regulation

$$\pi_p = (1 - p + s_p)[R_p - (1 - k_p)B_p] - c(s_p) - k_p(1 + \delta)$$

- If not subject to regulation

$$\pi_p = (1 - p + s_p)[R_p - (1 - k_p)B_p] - c(s_p) - k_p(1 + \delta)(1 + \eta)$$

- Where η is the certification cost

  → Normalized to 0 in the case of public certification

Main results

- Same qualitative results as in the dep insurance setup
- Tight flat (VaR) capital requirements result in

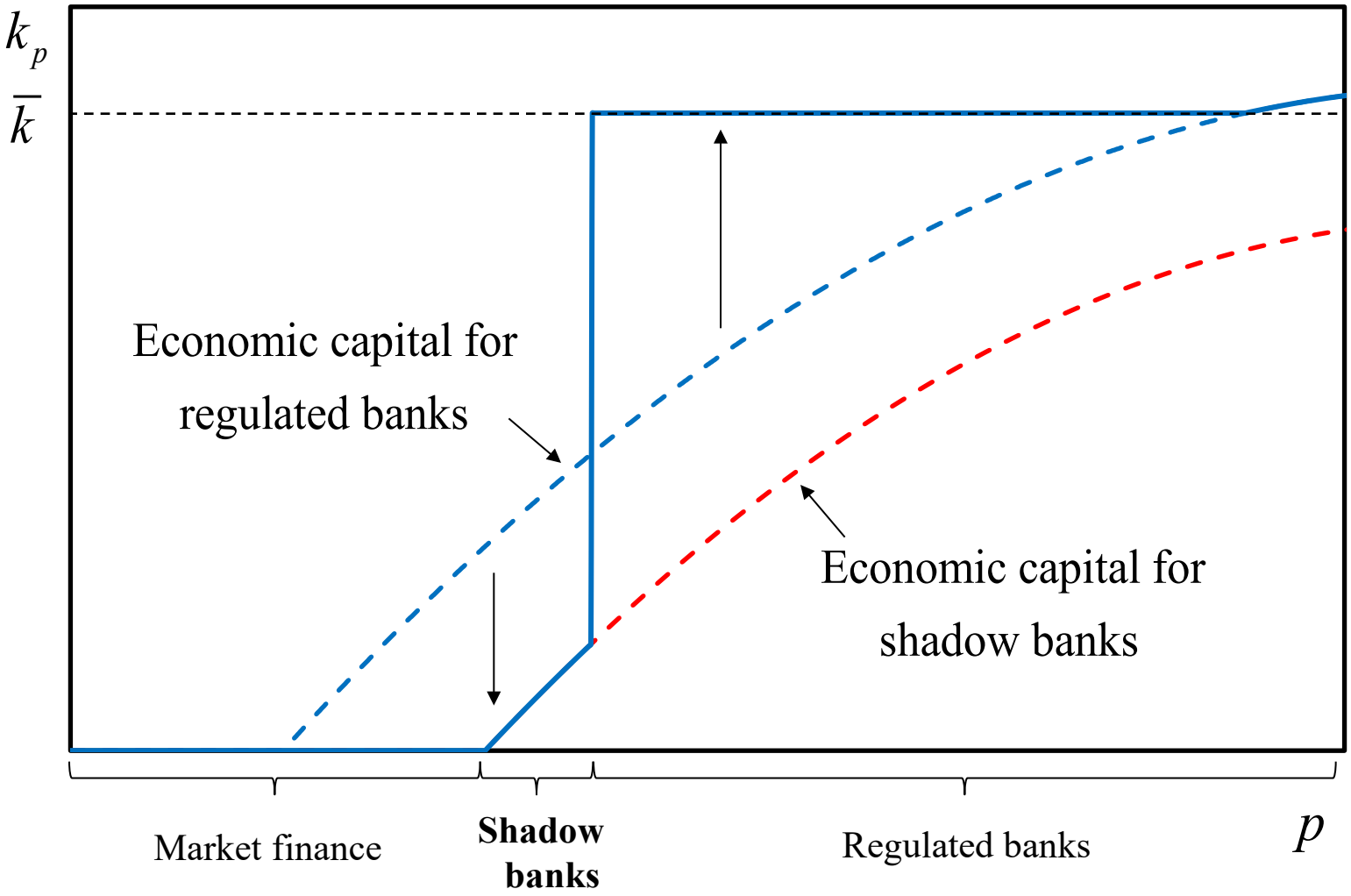
  → Low (high) risk unregulated finance
- Tightening of regulation can generate asymmetric effects

  → Safer (riskier) regulated (unregulated) finance
- Novel: Bank capital needs not be binding (capital buffer)

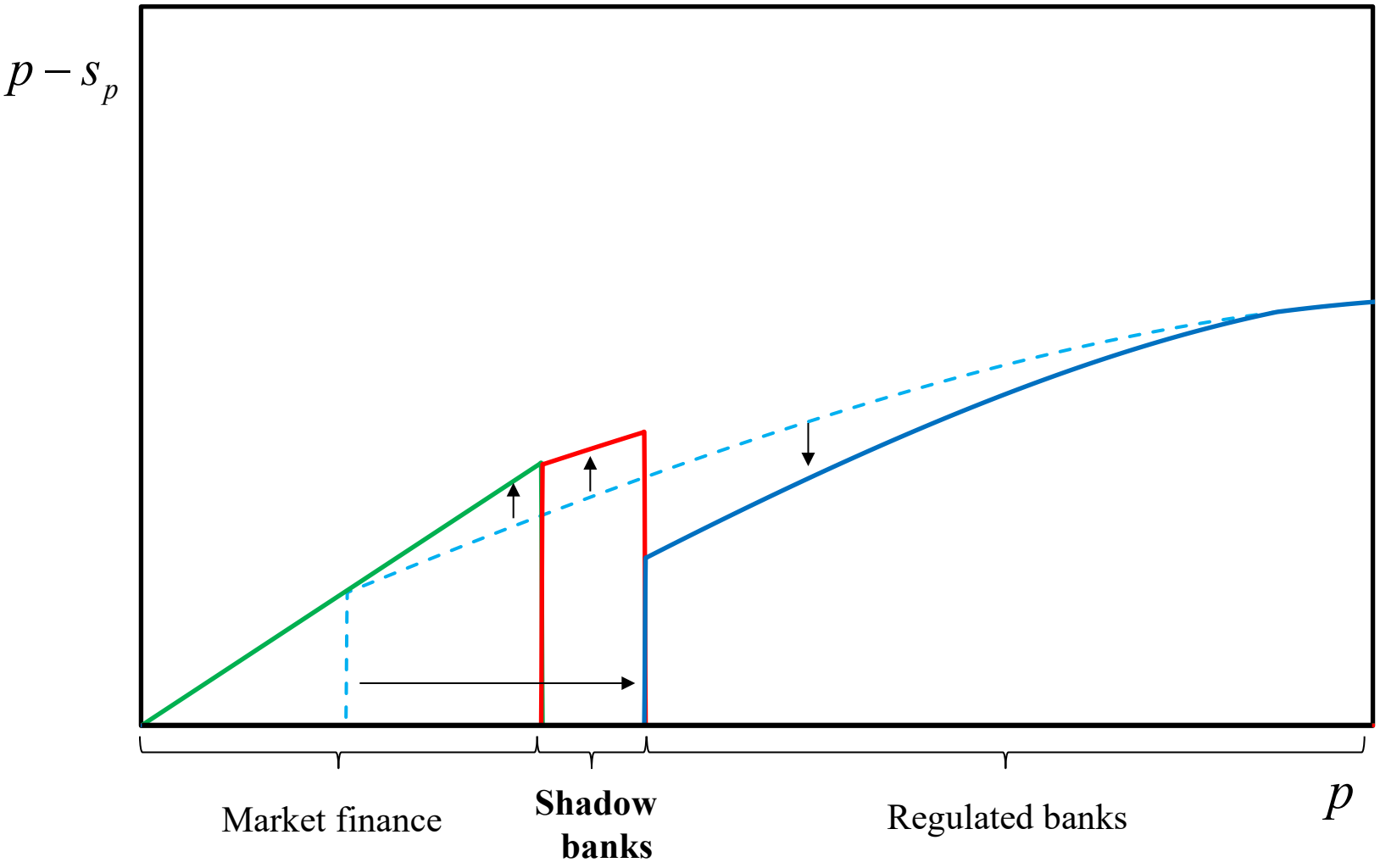
  → Depositors are not insured

  → Role to hold capital to reduce cost of debt

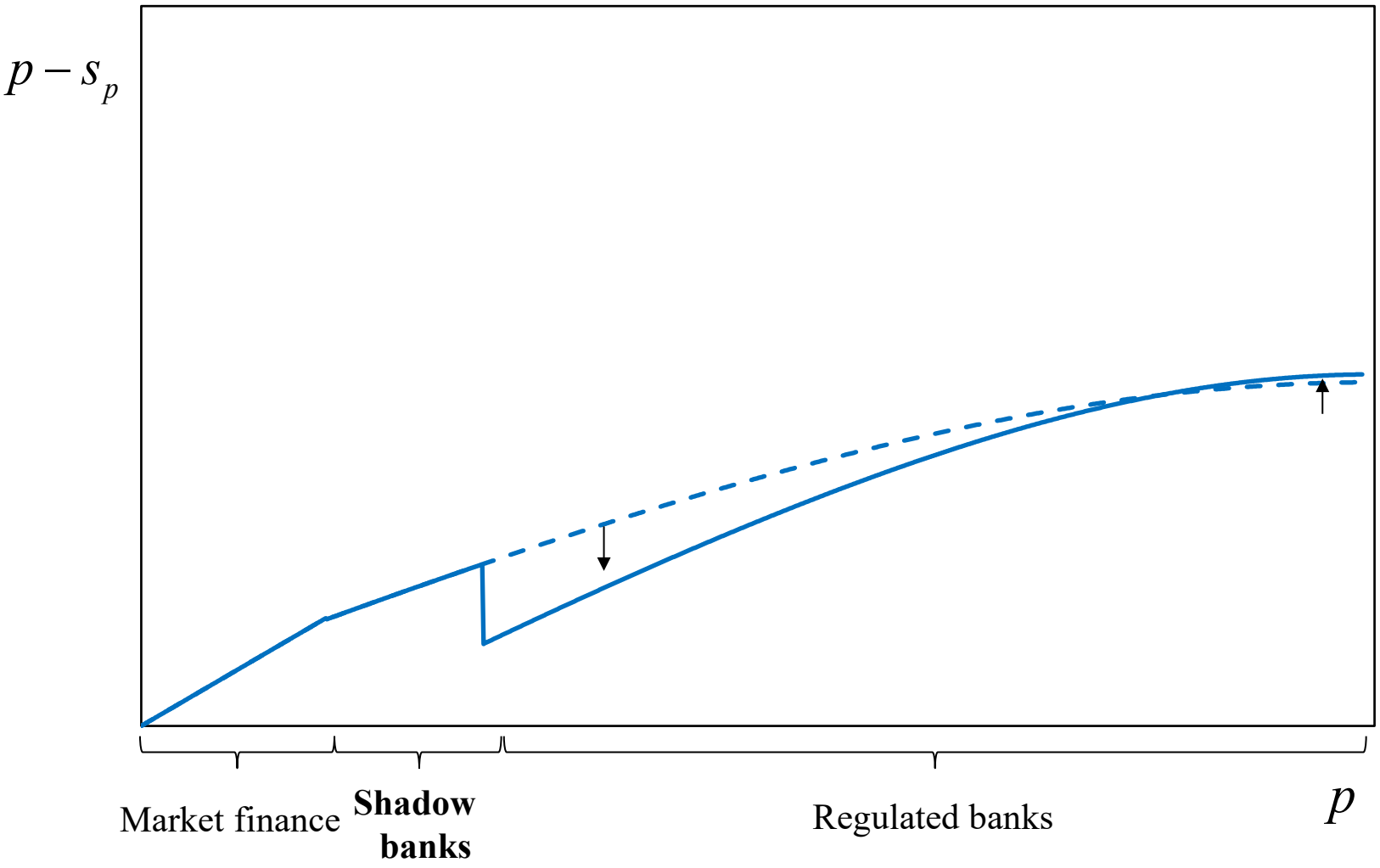
Capital with high flat requirements



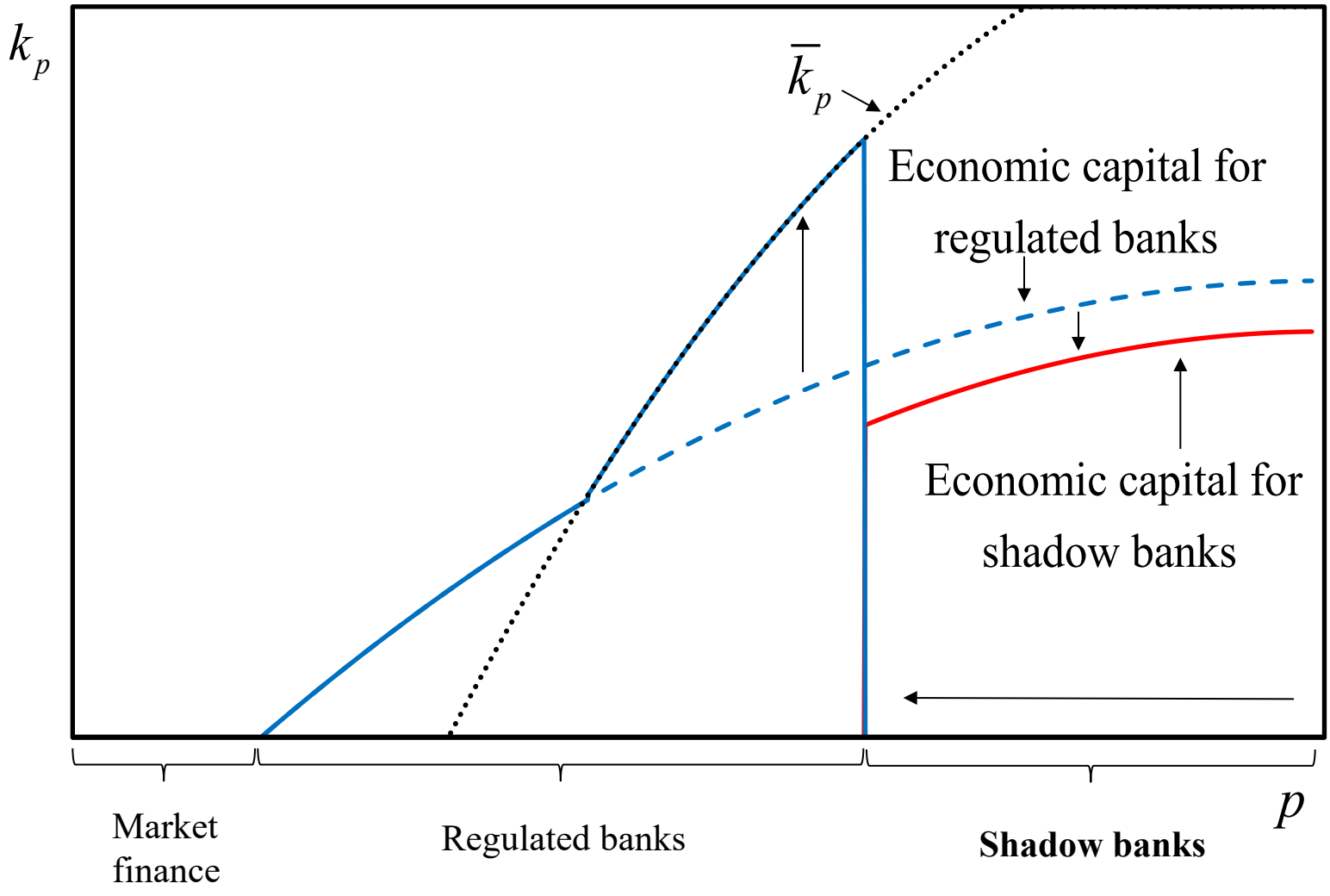
PD with high flat requirements



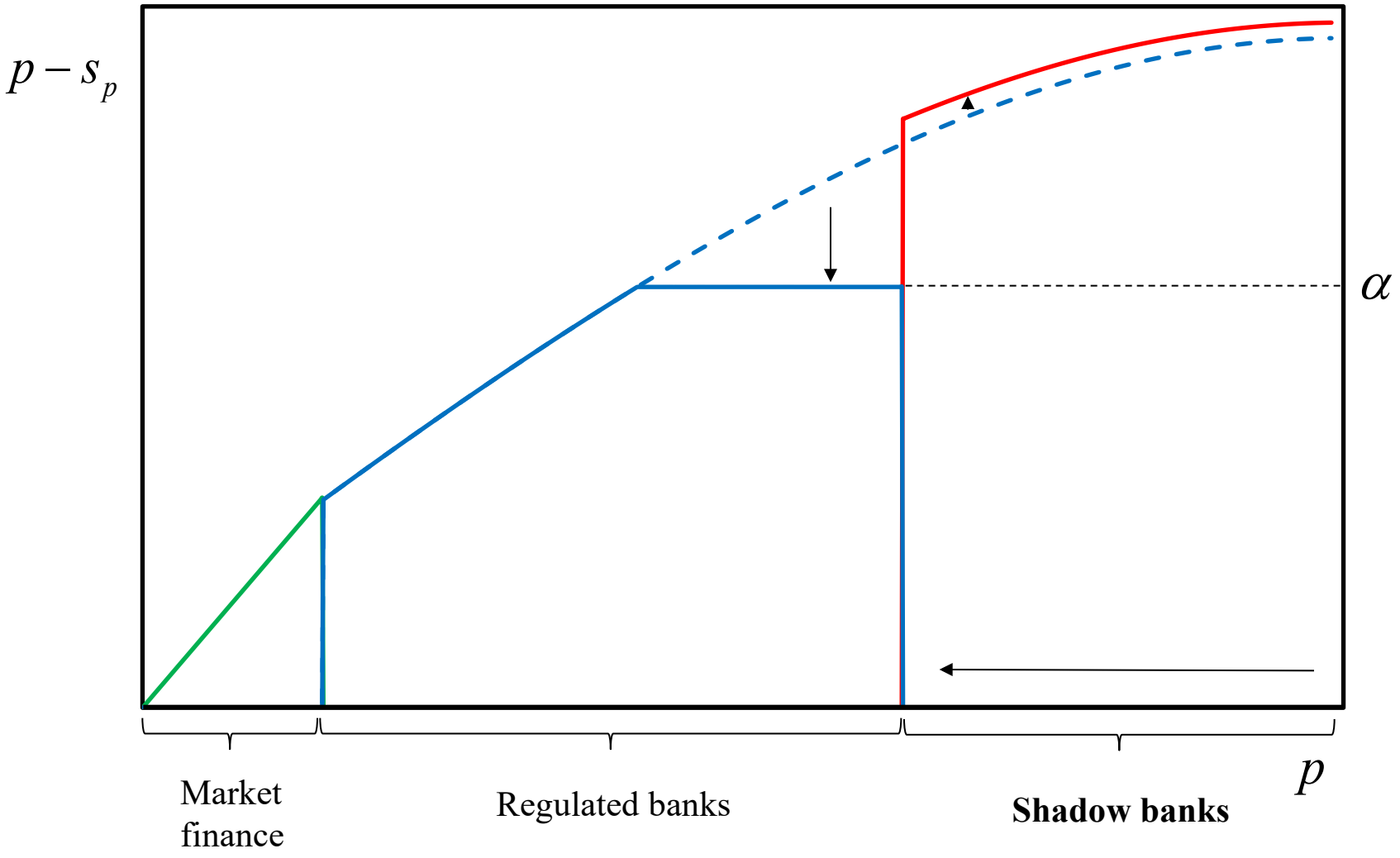
PD with high flat requirements (dep. ins.)



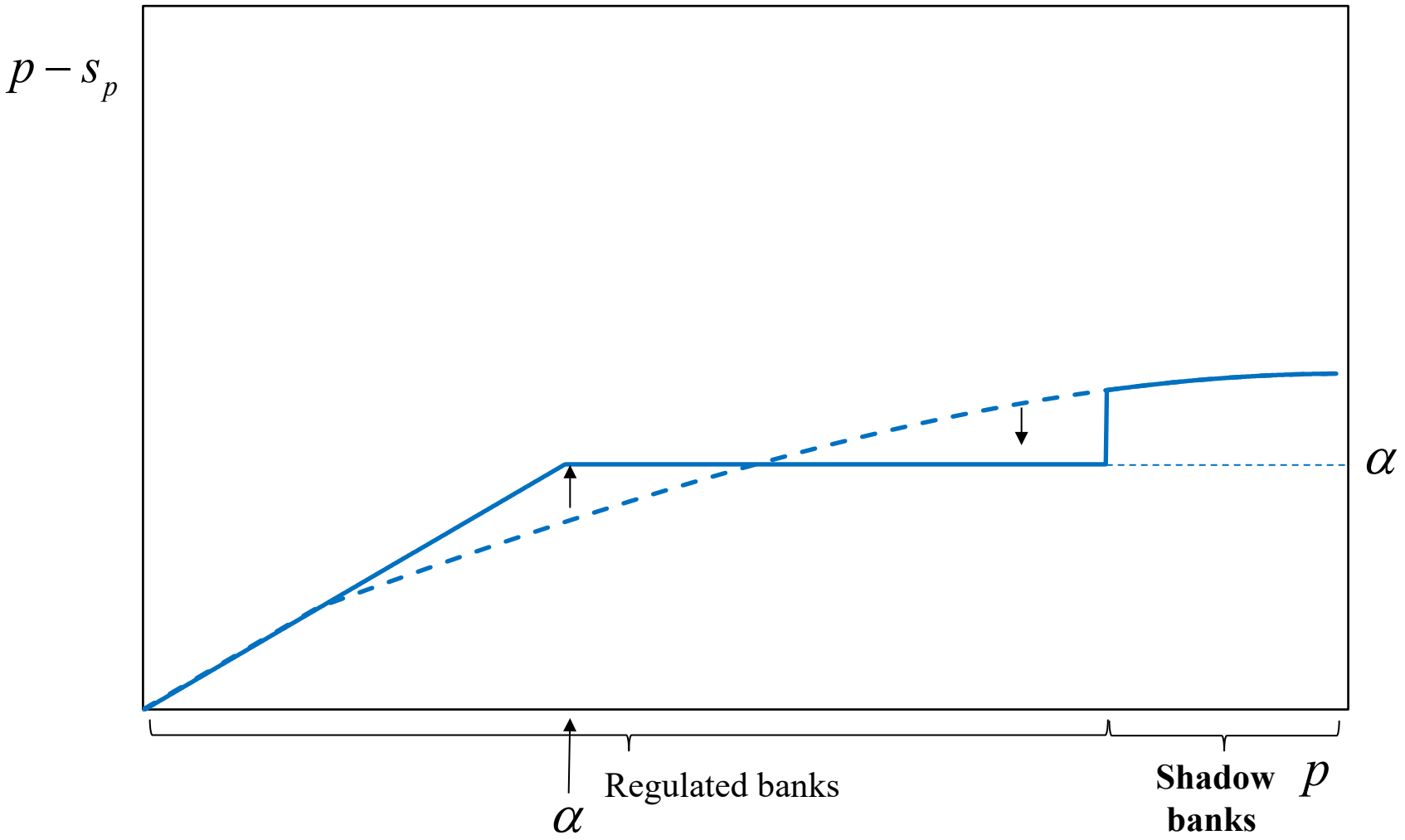
Capital with high VaR requirements



PD with high VaR requirements



PD with high VaR requirements (dep. ins.)



Part 4b

Changes in funding costs

Changes in funding costs

- Two key parameters

  → Expected return required by debtholders (safe rate) R_0

  → Excess cost of bank capital δ

Results

- Under flat or VaR requirements shadow banks will thrive when
  - → Safe rate is low (savings glut)
  - → Cost of capital is high
- Optimal capital requirements should be lowered when
  - → Safe rate is low
    - + To avoid lending shifting out of regulated banks
    - + Lower safe rates makes shadow bank more competitive
  - → Cost of capital is high
  - → Rationale for cycle dependent regulation

Part 4b

Endogenous cost of capital

Endogenous cost of capital

- Assume fixed supply of bank capital

  → Could also be upward sloping

- Tightening flat or VaR capital requirements affects all banks

  → Higher risk for those not constrained by the regulation

  → (Some regulated and all) shadow banks will be riskier

  → As a result of the higher cost of capital

Concluding remarks

Concluding remarks (i)

- Model of the effects of bank capital regulation on

  → Structure and risk of the financial system

- Key element: distinction between regulated and shadow banks

  → Based on deposit insurance subsidy for regulated banks

  → Alternative: Based on certification by supervisor

- Shadow banking will expand with

  → Higher costs of deposit insurance

  → Higher (supervisory) costs of public certification

Concluding remarks (ii)

- Model is set in terms of entrepreneurial finance

  → Could also be interpreted in terms of household finance

- Model assumes that screening reduces probability of default

  → Could also consider reducing loss given default

Concluding remarks (iii)

- Higher capital requirements

  → Ameliorate risk-taking incentives: bright side

  → Drive some borrowers to shadow banks: dark side

  → Flat requirements lead to medium risk shadow banks

  → VaR requirements lead to high risk shadow banks

Concluding remarks (iii)

- Higher capital requirements

  → Ameliorate risk-taking incentives: bright side

  → Drive some borrowers to shadow banks: dark side

  → Flat requirements lead to medium risk shadow banks

  → VaR requirements lead to high risk shadow banks

- Optimal requirements will <u>not</u> be VaR-based

  → Lower confidence level for higher risk