

**Hibah Kompetitif Penelitian Sesuai Prioritas Nasional  
Batch IV 2009 (Tahun I)**

# **Perbankan untuk Rakyat Miskin**

**Tinjauan Matematik Sistem Keuangan  
Alternatif Berbasis Bagi Hasil sebagai  
Upaya Mengurangi Kemiskinan**

**TONI BAKHTIAR  
IMAN SUGEMA  
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# Latar Belakang

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- Perbankan syariah dewasa ini merupakan sebuah industri yang berkembang cepat.
- Lebih dari 50 negara di seluruh dunia mengadopsi sistem perbankan syariah, mendampingi sistem konvensional yang ada.
- 2008: total aset USD500 miliar, tumbuh 10% per tahun selama 10 tahun terakhir.
- Pangsa pasar: 12% (Malaysia), 17% (GCC countries), 3% (Indonesia).



# Latar Belakang

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- Chapra (1985): perbankan syariah merupakan sistem keuangan yang adil.
- Algaoud & Lewis (2007) memberikan kritik terhadap sistem keuangan berdasarkan suku bunga.

## Tetapi...

- Dar & Presley (2000): PLS features marginally in the practice of islamic banking and finance (< 20% worldwide). Islamic Development Bank (IDB) has so far not used PLS in its financial business.
- Chong & Liu (2009): a large majority of islamic bank financing in Malaysia is still based on interest mechanism. The rapid growth in islamic banking is largely driven by the islamic resurgence worldwide rather than by the advantages of the PLS paradigm.
- **Benarkah sistem bagi hasil lebih superior dibandingkan sistem bunga?**
- **Dapatkah sistem bagi hasil meningkatkan kesejahteraan?**



# Tujuan

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- Melakukan kajian analitis terhadap skema bagi hasil dan analisis komparatif terhadap sistem suku bunga.
- Mengukur efek penggunaan skema bagi hasil terhadap kesejahteraan yang diukur dari distribusi pendapatan (*income distribution*).
- Membuktikan bahwa mekanisme *risk pooling agent* dapat ditempuh untuk meningkatkan kinerja skema bagi hasil dari sudut pandang pemilik modal.



# Urgensi

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- Kebanyakan ekonom syariah berpendapat bahwa sistem perbankan syariah adalah sistem keuangan yang lebih adil. Namun, umumnya pendapat tersebut hanyalah sekedar klaim tanpa didasari model teoretis yang rinci. Sebaliknya, beberapa penelitian melaporkan bahwa skema bagi hasil gagal diadopsi dalam transaksi keuangan disebabkan beberapa hal.
- Oleh karena itu, mengembangkan teori dan analisis matematik yang mendukung atau menolak klaim tersebut merupakan kebutuhan yang sangat mendesak. Adakah sistem keuangan alternatif yang dapat meningkatkan kesejahteraan dan mengurangi kemiskinan?




# Metode

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- Pendekatan CRS *production function*:
- Dua situasi akan dibahas:
  1. production without uncertainty:  $Y = F(K,L)$
  2. production under uncertainty:  $Y = g(\theta)F(K,L)$
- Analisis dilakukan terhadap tiga kasus:
  1. shock netral (*neutral shock*),
  2. shock negatif (*adverse shock*),
  3. shock positif (*favorable shock*).



Interest-based system



PLS-based system



# Tahapan

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## Teori

Membuktikan secara analitis bahwa dalam situasi yang lebih umum, skema bagi hasil lebih unggul daripada skema suku bunga.

Tahun I

## Aplikasi

Membuktikan secara analitis bahwa sistem keuangan berbasis bagi hasil kebal terhadap masalah *asymmetric information*.

Tahun II

Melakukan kajian analitis dan aplikatif terhadap penggunaan skema bagi hasil dalam transaksi keuangan lainnya.

Tahun III



# Production Technology

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In competitive market, MPK = price of capital

- In the interest-based credit market, the price of capital is called interest rate  $r$  and thus:

$$\text{profit} = \pi y - rk = \pi f - rk.$$

$$\text{max profit} : \pi f' - r = 0 \Leftrightarrow r = \pi \text{MPK}.$$

Efficiency occurs iff  $r = \text{MPK}$ , and then it is just.

- In PLS-based credit market:

$$p = \text{MPK}.$$

But the price of capital  $p$  is not quoted as interest rate, rather as a share of profit. Suppose  $\alpha^*$  is the optimal share to be efficient, then

$$\alpha^* y = pk \Leftrightarrow \alpha^* = \frac{\text{MPK}}{\text{APK}}.$$

If  $\alpha > \alpha^*$  then the capital is over-priced. If  $\alpha < \alpha^*$ , under-priced.





# Production Technology

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In summary:

- *Under production certainty and competitive market the PLS as well as interest based credit market will end up with the same price of capital.*
- The price is quoted explicitly as interest rate or quoted implicitly as the share does not matter. Both systems are efficient and just.

**But, the real world is far from certain....**



# Production under Uncertainty

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- Suppose a productivity shock  $\theta$  to be uncertain and it affects the production function:

$$Y = g(\theta)F(K, L) \iff y = g(\theta)f(k),$$

where

$$E[g(\theta)] = \mu,$$

$$\text{var}[g(\theta)] = E[g(\theta) - \mu]^2 = \sigma^2.$$

- Three cases of shocks:
  - Neutral shock:  $g(\theta) = 1$ ,
  - Adverse shock:  $g(\theta) < 1 \rightarrow$  decrease the production
  - Favorable shock:  $g(\theta) > 1 \rightarrow$  increase the production



# Interest-based Credit Market

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- Market equilibrium under competitive market

$$r = E[\text{MPK}].$$

This level of interest should be paid by all firms irrespective whether the shock affects positively or negatively.

- **Neutral shock:**

$$E[\text{MPK}|g(\theta) = 1] = E[\text{MPK}] = r.$$

The market is efficient and the price is right.



# Interest-based Credit Market

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- Adverse shock:

$$E[\text{MPK} | g(\theta) < 1] < E[\text{MPK}] = r.$$

- The expected marginal product is smaller than prevailing market interest rate.
- MVPK of borrowed capital is less than marginal cost.
- The price of capital is too expensive.



# Interest-based Credit Market

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- Favorable shock:

$$E[\text{MPK} | g(\theta) > 1] > E[\text{MPK}] = r.$$

The price of capital is too cheap to borrower.

- In summary:
  - Interest-based credit market is only efficient and just iff the shock does not affect the MPK.
  - Efficiency is only provided on market level. In terms of individual borrower and lender, efficiency cannot be warranted.



# PLS-based Credit Market

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- An efficient PLS regime can exist iff

$$\alpha^* y = pk \iff \alpha^* = \frac{E[\text{MPK}]}{E[\text{APK}]}$$

- Note that  $\text{MPK}_i$  and  $\text{APK}_i$  may be different for every borrower, but  $E[\text{MPK}]$  and  $E[\text{APK}]$  are all the same.
- Thus,  $\alpha^*$  is the same for every firms (market driven share).
- Let see the proof....



# PLS-based Credit Market

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- Suppose  $\alpha_i^*$  is the optimal share for borrower  $i$ . Then,

$$\alpha_i^* = \frac{\text{MPK}_i}{\text{APK}_i} = \frac{g(\theta_i)f'(k)}{g(\theta_i)f(k)/k} = \frac{f'(k)}{f(k)/k} = \frac{E[\text{MPK}]}{E[\text{APK}]}.$$

- But, the price of borrowed capital is not the same:
- **Neutral shock:**  $p_i = \text{MPK}_i = g(\theta_i)f'(k)$ .
- **Adverse shock:**  $p_i = f'(k) = E[\text{MPK}]$ .
- **Favorable shock:**  $p_i = g(\theta)f'(k) < E[\text{MPK}]$ .  
 $p_i = g(\theta)f'(k) > E[\text{MPK}]$ .



# PLS-based Credit Market

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In summary:

- The price of capital is correlated with the shock.
- The risk is shared between borrower and lender (**this is the main difference between PLS and interest**)
- Efficiency is always warranted both at individual and market level.





# PLS vs. Interest: Summary

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Shocks	Interest-based	PLS-based
Neutral	Price is right. Efficient and just.	Price is right. Efficient and just.
Adverse	Price is too expensive. Not just for borrower.	Price is less than average price. Risk is shared. Efficient and just.
Favorable	Price is too cheap. Not just for lender.	Price is higher than average price. Risk is shared. Efficient and just.



# Effect on Income Distribution

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$$Y = \theta^\alpha L^{1-\alpha}, E[\theta] = 1, \text{var}[\theta] = 0.57^2, \alpha = 0.2.$$

	Average	Std. Dev.	Gini
<b>Production without Uncertainty</b>			
Interest based credit			
Income to labor owner	0.8	0	0
Income to capital owner	0.2	0	0
PLS based credit			
Income to labor owner	0.8	0	0
Income to capital owner	0.2	0	0
<b>Production under Uncertainty</b>			
Interest based credit			
Income to labor owner	0.8	0.57	0.41
Income to capital owner	0.2	0	0
PLS based credit			
Income to labor owner	0.8	0.46	0.33
Income to capital owner	0.2	0.11	0.33

PLS system is favorable for borrowers but not for lenders.



# Risk Pooling Agent

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- Borrowers may prefer PLS but lenders will prefer interest.
- Is there any mechanism that will enhance the performance of PLS systems from capital owners perspective?
- Yes, provided there is a large enough islamic bank which conducts as a risk pooling agent.
- Such a bank will grasp all the risk challenged by capital owners.



# Risk Pooling Agent

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- Suppose there are  $n$  depositors and each puts  $K$  unit of capital. The fund is allocated evenly to  $n$  borrowers.
- The banks total income:

$$E[B] = E \left[ \sum_{j=1}^n \alpha^* g(\theta_j) f(k) \right] = \alpha^* \sum_{j=1}^n E[g(\theta_j) f(k)] = n\alpha^* E(y).$$

- Average income:  $\alpha^* E(y)$
- Payment per borrower:  $\alpha^* y_i$
- Variance of payment:  $\alpha^{*2} \sigma^2$
- Income per borrower:  $(1 - \alpha^*) y_i$
- **Variance of borrowers income:**  $(1 - \alpha^*)^2 \sigma^2 < \sigma^2$



# Risk Pooling Agent

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- Since the variance of borrowers income is

$$(1 - \alpha^*)^2 \sigma^2 < \sigma^2,$$

then PLS scheme can reduce the risk faced by borrowers.

- The risk is then not transmitted to depositors as the bank has a risk pooling mechanism.
- Provided  $n$  is large enough, then  $E[g(\theta)] = 1$ . Hence,

$$E[B] = n\alpha^* f(k),$$

where the risk factor  $g(\theta)$  disappears.

- Effects of the shocks are canceled-out. Bank bears no risk.



# Risk Pooling Agent

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- Income distribution in the presence of a risk pooling bank

	Average	Std. Dev.	Gini
<b>Production under Uncertainty</b>			
Interest based credit			
Income to labor owner	0.8	0.57	0.41
Income to capital owner	0.2	0	0
PLS based credit			
Income to labor owner	0.8	0.46	0.33
Income to capital owner	0.2	0	0



# Simpulan

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- Di bawah asumsi pasar bersaing dan kepastian produksi, pasar kredit berbasis suku bunga dan bagi hasil adalah efisien dan adil asalkan harga modal (*price of capital*) sama dengan produk marjinalnya (*marginal product of capital*).
- Dalam kondisi ketidakpastian, pasar kredit berbasis suku bunga adalah efisien dan adil hanya jika *shock* bersifat netral. Sistem ini menjadi tidak adil bagi peminjam pada kasus *shock* negatif dan menjadi tidak adil bagi pemilik modal pada kasus *shock* positif. Selain itu, sistem berbasis suku bunga hanya menjamin efisiensi di tingkat agregat tetapi tidak di tingkat individu.
- Pada pasar kredit berbasis bagi hasil, pada kasus *shock* negatif harga modal lebih rendah daripada harga rata-rata dan pada kasus *shock* positif harga modal lebih tinggi daripada harga rata-rata. Terjadi pembagian risiko antara pemilik modal dan peminjam.



# Simpulan

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- Pembagian risiko di pasar kredit berbasis bagi hasil menunjukkan bahwa efisiensi di level agregat dan individu selalu dijamin. Dalam kasus ini *share* optimal bersifat tunggal dan besarnya sama dengan rasio antara nilai harapan dari produk marjinal dan produk rata-rata.
- Dari sisi distribusi pendapatan, pemilik modal di bawah sistem konvensional menikmati pendapatan yang seragam (*no variability*) sedangkan di bawah sistem bagi hasil, variabilitas pendapatan peminjam berkurang dan variabilitas pendapatan pemilik modal bertambah. Skema bagi hasil dengan demikian mengurangi risiko yang dihadapi peminjam tetapi dalam waktu yang bersamaan meningkatkan risiko yang dihadapi pemilik modal. Akibatnya **sistem bagi hasil lebih disukai oleh para peminjam tetapi tidak para pemilik modal.**
- Peran sebagai *risk pooling agent* yang dipegang oleh bank syariah terbukti dapat menjaga distribusi pendapatan pemilik modal dan sekaligus mengurangi risiko yang dihadapi peminjam.





## Rencana Penelitian Tahun II

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- Sistem perbankan konvensional selalu menggunakan instrumen suku bunga untuk menangani masalah *asymmetric information* melalui kenaikan suku bunga kredit dan penerapan agunan (*collateral*) atas kredit.
- Implikasinya sangat jelas, masalah *asymmetric information* dapat menyebabkan akibat yang sangat serius terhadap masyarakat miskin.
- Dapatkah sistem bagi hasil menyelesaikan masalah *asymmetric information*?



# Rencana Penelitian Tahun II

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- Skema Bagi Hasil dan Masalah *Asymmetric Information*

