# "Recent developments in the theory of offshoring"

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**Aachen Workshop on International Production**

**RWTH Aachen, Nov. 6-7, 2009**

# Where do I see interesting new developments?

1. **Offshoring, comparative advantage and wages: Two paradigms**
   (a) Discrete unbundling of comparative advantage: "Convex hull analysis"
   (b) Continuous trade in tasks
2. **Offshoring and unemployment**
   (a) Minimum wages, fair wages ("Convex-hull analysis")
   (b) Offshoring in a welfare state model
3. **Offshoring and country size**
   The home market effect of trade in tasks – revisiting the skill-premium
4. **Offshoring and trade policy**
   A new case for activist trade policy?

# Offshoring: New theory for an old phenomenon

*"Early on (thirteenth century), then, merchants began to hire cottage workers to perform some more tedious, less skilled tasks. In the most important branch, the textile manufacture, peasant women did the spinning on a putting-out basis: the merchant gave out (put out) the raw material – the raw wool and flax, and, later, cotton – and collected the finished yarn"*

[ D. Landes, The Wealth and Poverty of Nations, 1998, p.43 ]

*"... cities were up in arms complaining about 'unfair competition'; in Italy and the Low Countries strict limits were imposed on the extent of the putting out. Seven centuries later, the key political economy issues are not much different, but addressed on a global scale"*

[ R.W. Jones and H. Kierzkowski, International fragmentation and the new economic geography, NAJEF, 2005, p.3 ]

# Offshoring: Unbundling of comparative advantage

- Pioneered by Jones (2000)
- General equilibrium focus
- Unbundling / offshoring as a discrete regime switch
- Offshoring a two-way affair
- No strong ranking assumption [ see also Harms, Lorz & Urban (2009) ]
- General also in terms of dimensions

$\Longrightarrow$ Frustrating experience:

- Unwieldy analysis
- Hard to derive strong general results
- Categorization of possible patterns of unbundling and factor price effects
- "Hypersensitivity"

# Offshoring/Unbundling: Convex hull analysis

- Convex hull: lower envelope of unit-value isoquants in factor space
  - Technology
  - World prices
  - Country endowment

  $\Longrightarrow$ factor prices, welfare
- Offshoring: shift in convex hull
- Technology involves different components of value added, e.g.
  - engineering tasks
  - accounting tasks
  - management tasks, etc.
- Each component draws on different types of factors (same for all countries)
- Each country differently productive in different components ("latent Ricardo" in components)

# Comparative advantage

**... bundled:**

- Final demand (willingness to pay) is for entire bundles of components
- Only entire bundles of components tradable across countries
- A country's inefficient components bundled with its efficient ones
- Inefficient components receive bundling protection
- Efficient components: burden of being bundled with inefficient ones
- Hidden (unexploited) arbitrage opportunities

**... unbundled:**

- Tradability of single components
- BUT: Final demand still only for bundles
- STILL: Inefficient components lose bundling protection
- Efficient components "freed up" to their full efficiency potential

**Figure 1:** Bundled comparative advantage and factor prices with Ricardian efficiency gaps

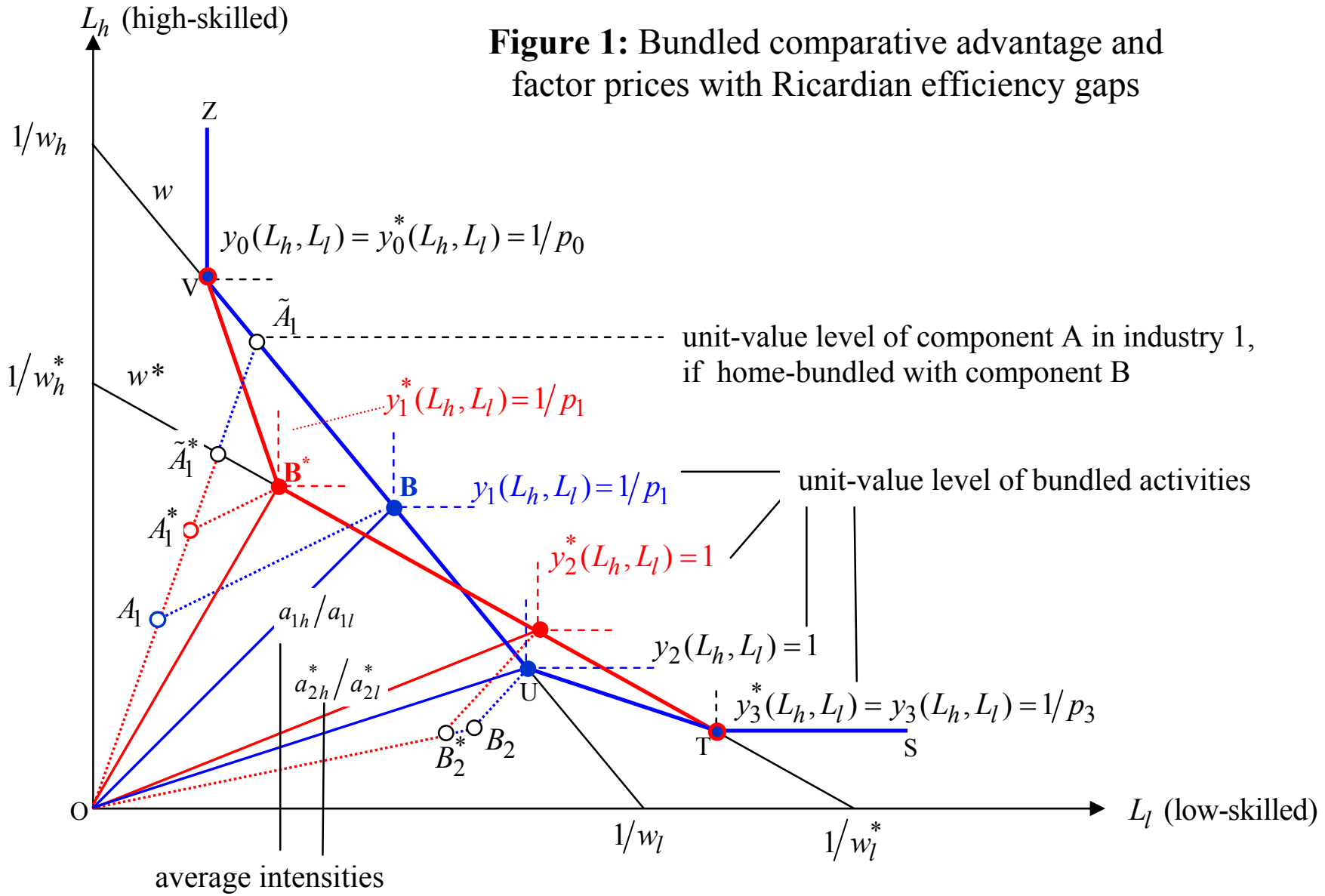
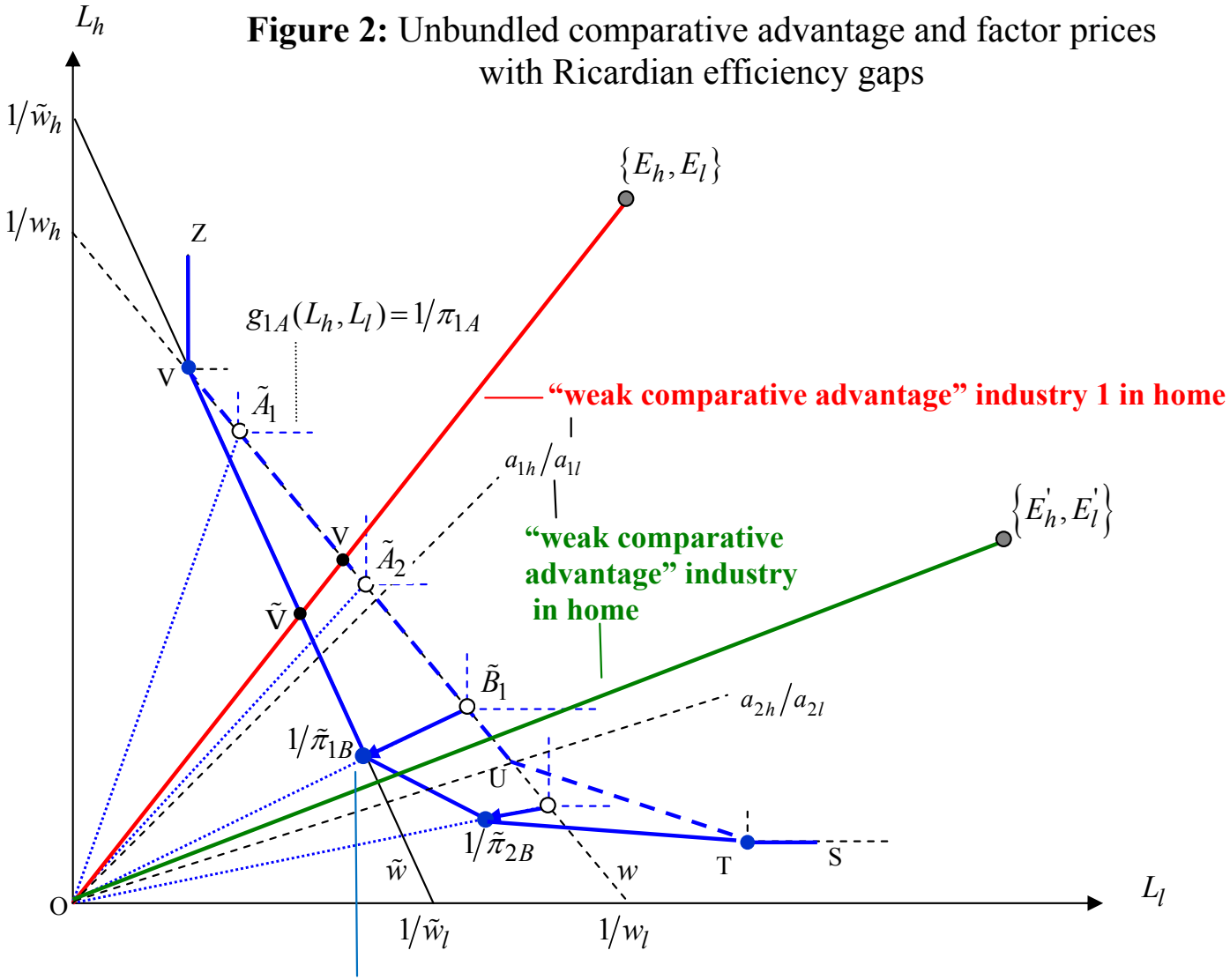


**Figure 2:** Unbundled comparative advantage and factor prices with Ricardian efficiency gaps




**unit-value level of component B in industry 1, if foreign-bundled with component A**

- Looking at skill-abundant home: Unskilled labor gains and skilled labor loses if
  - offshoring occurs *only* in "weak comparative advantage industries", with
  - less skill-intensive fragment retained in home (case with $\{E_h, E_l\}$ in the figure)
- Opposite result if offshoring
  - occurs *only* in "strong comparative advantage industries", with
  - viability of more skill-intensive fragment retained in home (case with $\{E'_h, E'_l\}$ in the figure)
- High-skilled labor loses, whenever offshoring takes place *only* in industries "close to the margin of comparative advantage"
- Opposite result, whenever .... *only* in industries "distant from the margin of comparative advantage"

  [ see Kohler (2007) for exact definitions ]

**Punchline:** The skill-intensity of the fragments lost is irrelevant as such, it's the skill-intensity of the surviving fragments that matters, relative to the economy's endowment

- Pareto improvement: Always possible through lump-sum redistribution
- Without redistribution, Pareto improvement is *guaranteed*, if offshoring takes place "evenly" in industries
  - close to the margin of comparative advantage and
  - distant from the margin of comparative advantage

  irrespectively of further details (sufficient condition)
- Pareto improvement *may* also happen in other cases (no necessary condition)

# Offshoring: Continuous trade in tasks

- Problems with discrete unbundling analysis
  - Defies the use of calculus
  - Extreme shifts in specialization (see figure above)
  - Unwieldy analysis
  - No conceptual distinction between extensive and intensive margin of offshoring
- Solution: Continuum of tasks $k \in [0, 1]$
  - Earlier literature: Feenstra & Hanson (1997), Kohler (2004)
  - Grossman & Rossi-Hansberg (2008,2009): factor-specific tasks,
  - Kohler (2008): industry-specific task, involving all factors, with unit cost $c(w_h, w_l, k)$
- Strong ranking assumptions with regard to tasks (fragments),
  - $\gamma := c(w_h, w_l, k)/c(w_h^*, w_l^*, k)$, assumed decreasing in $k$ (due to skill-ranking)
  - cost of cross-border provision (dislocation): $t(k)$ assumed increasing in $k$

- Define $j$ as "cut-off"-value of $k$ for offshoring $\Longrightarrow$ unit cost *with offshoring*

$$\tilde{c}_i(w_h, w_l, j) \; := \int_0^j t_i(k) f_i(k) \left[a_{ih}(k) w_h^* + a_{il}(k) w_l^*\right] \mathrm{d}k + \int_j^1 f_i(k) \left[a_{ih}(k) w_h + a_{il}(k) w_l\right] \mathrm{d}k \tag{1}$$

- Cost-minimization through offshoring (for given $w_h, w_l$):

$$\min_j \tilde{c}_i(w_h, w_l, j) \quad \Longrightarrow \quad \text{f.o.c.:} \quad \gamma_i(w_h, w_l, j) / \, t_i(j) = 1 \tag{2}$$

$$\Longrightarrow \quad \text{s.o.c.:} \; \frac{\gamma_i(w_h, w_l, j)}{t_i(j)} \text{ decreasing in } j \tag{3}$$

- Endogenous extensive margin of offshoring from f.o.c.:

$$J_i = J_i(w_h, w_l, w_h^*, w_l^*) \quad \text{from f.o.c.} \tag{4}$$

full description of offshoring characteristics of sector $i$

- Average factor requirements( for $s = h, l$)

$$\tilde{a}_{is}(w_h, w_l, w_h^*, w_l^*) := a_{is} \times \underbrace{\int_{J_i(w_h, w_l, w_h^*, w_l^*)}^{1} f_i(k)\mathrm{d}k}_{\text{"mass" of domestic tasks}} \tag{5}$$

$$\bar{a}_{is}(w_h, w_l, w_h^*, w_l^*) := a_{is} \times \underbrace{\int_{0}^{J_i(w_h, w_l, w_h^*, w_l^*)} \beta_i z_i(k) f_i(k)\mathrm{d}k}_{\text{"mass" of foreign tasks (c.i.f.)}} \tag{6}$$

- These intensities are factor-price-sensitive, even if $a_{is}$s are Leontief
- Scaling assumption (for simplicity only):

$$\int_0^1 f_i(k)\mathrm{d}k = 1 \tag{7}$$

- General equilibrium for two sectors $i = 1, 2$ (writing $\bar{a}_{ih}(w_h, w_l)$ for ease of notation):
  - Zero-profit conditions:

$$\underbrace{p_i - [\bar{a}_{ih}(w_h, w_l)w_h^* + \bar{a}_{il}(w_h, w_l)w_l^*]}_{\text{"effective" price } \pi_i(p_i, w_h, w_l)} \leq \tilde{a}_{ih}(w_h, w_l)w_h + \tilde{a}_{il}(w_h, w_l)w_l$$

$$\text{with equality if} \quad J_i(w_h, w_l, w_h^*, w_l^*) < 1 \tag{8}$$

  - Full employment, with $y_i$ as final output levels:

$$\tilde{a}_{1s}(w_h, w_l)y_1 + \tilde{a}_{2s}(w_h, w_l)y_2 = L_s \quad \text{for} \quad s = h, l \tag{9}$$

  - Endogenous variables: $w_h$, $w_l$, $J_1$, $J_2$, $y_1$, $y_2$
  - Exogenous: $p_i$, $w_h^*$, $w_l^*$, $L_h$, $L_l$

- Globalization: Easier offshoring, uniformly across all $k$

$$\text{specification:} \quad t_i(k) = \beta_i z_i(k) \quad \text{with } z_i' > 0 \tag{10}$$

$$\text{scenario:} \quad \hat{\beta}_i := \mathrm{d}\beta_i/\beta_i < 0, \quad \text{and} \quad \hat{\beta}_1 \neq \hat{\beta}_2 \tag{11}$$

- Simplification: homogeneous fragments / tasks: $a_{is}(k) = a_{is}$

- $\gamma_i(w_h, w_l, k)$ now independent of $k$, unique interior solution through $z_i' > 0$

- F.o.c. on extensive margin now emerging as

$$a_{ih} w_h^* + a_{il} w_l^* = \frac{a_{ih} w_h + a_{il} w_l}{\beta_i z_i(J_i)} \tag{12}$$

- Zero profit conditions

$$p_i - \frac{\underbrace{(a_{ih}w_h^* + a_{il}w_l^*)}\,\beta_i}{\underline{a_{ih}w_h + a_{il}w_l}\;\beta_i z_i(J_i)} \int_0^{J_i(w_h,w_l)} z_i(k) f_i(k)\mathrm{d}k \leq (a_{ih}w_h + a_{il}w_l) \int_{J_i(w_h,w_l)}^{1} f_i(k)\mathrm{d}k$$

$$p_i = (a_{ih}w_h + a_{il}w_l)\, S_i\left[J_i\left(w_h, w_l, w_h^*, w_l^*\right)\right] \tag{13}$$

$$\text{where} \quad S_i\left[\cdot\right] := \frac{1}{z_i(J_i)} \int_0^{J_i(w_h,w_l)} z_i(k) f_i(k)\mathrm{d}k + \int_{J_i(w_h,w_l)}^{1} f_i(k)\mathrm{d}k \tag{14}$$

- Interpretation of $S_i\left[\cdot\right] < 1$: Factor cost savings through offshoring

$$S_i' = -\frac{z_i'}{z_i^2} \int_0^{J_i(w_h,w_l)} z_i(k) f_i(k)\mathrm{d}k < 0, \quad \text{if } j_i^* > 0 \tag{15}$$

Define elasticity $\omega_i := S_i' J_i / S_i < 0$ (16)

- Comparative statics of zero profits (factor cost shares $\theta_{is}$):

$$\theta_{ih}\hat{w}_h + \theta_{il}\hat{w}_l + \omega_i \hat{J}_i = 0 \tag{17}$$

- Comparative statics of f.o.c. at the extensive margin:

$$\hat{J}_i = \frac{1}{\zeta_i}\left(\theta_{ih}\hat{w}_h + \theta_{il}\hat{w}_l - \hat{\beta}_i\right) \quad \text{with} \quad \zeta_i := z_i' J_i / z_i > 0 \tag{18}$$

- Inserting $J_i$ from extensive margin

$$\frac{\omega_i}{\zeta_i + \omega_i}\hat{\beta}_i = (\theta_{ih}\hat{w}_h + \theta_{il}\hat{w}_l) \quad [\ \omega_i < 0,\ \zeta_i > 0\ ] \tag{19}$$

- Unambiguous result, because [ see Kohler (2008) ]

$$\frac{\omega_i}{\zeta_i + \omega_i} \equiv -\frac{1}{z_i(J_i)} \frac{\int_0^{J_i(w_h,w_l)} z_i(k) f_i(k) \mathrm{d}k}{\int_{J_i(w_h,w_l)}^{1} f_i(k) \mathrm{d}k} < 0 \tag{20}$$

- Intuition: $\hat{\beta}_i < 0$ affects inframarginal tasks $k < J_i(w_h, w_l)$
- Operates like an increase in the output price of good $i$ or equivalently: Hicks-neutral *productivity* increase in $i$
- Compare to increase in the *effective (imputed) price* for domestic operations in discrete unbundling analysis [ Kohler (2003,2007) ]
- Comparative statics of wages: from *Stolper-Samuelson logic:*

$$\hat{w}_h > \frac{\omega_1}{\zeta_1 + \omega_1}\hat{\beta}_1 > \frac{\omega_2}{\zeta_2 + \omega_2}\hat{\beta}_2 > \hat{w}_l \quad \textbf{if} \quad \frac{a_{1h}}{a_{1l}} > \frac{a_{2h}}{a_{2l}} \tag{21}$$

and vice versa (assuming diversification)

- Result in accord with the insight from discrete unbundling
- Outputs: *Rybzcynski logic* – no repercussion on factor prices (diversification)

- Interpretation of the elasticity $\omega_i/(\zeta_i+\omega_i)$
  - At the margin (f.o.c) we have $\frac{1}{z(J_i)} = \frac{c_i(w_h^*,w_l^*)}{c_i(w_h,w_l)}$
  - Hence

$$\frac{\omega_i}{\zeta_i+\omega_i} \equiv -\frac{c_i(w_h^*,w_l^*)\int_0^{\hat{J}_i} z_i(k)f_i(k)\mathrm{d}k}{c_i(w_h,w_l)\int_{\hat{J}_i}^1 f_i(k)\mathrm{d}k} \tag{22}$$

$$= -\frac{\psi}{1-\psi} \quad \text{with } \psi\text{: share of offshore cost} \tag{23}$$

  - *Initial share* of offshoring cost $\psi$ acts as a "leverage" for effects of globalization
- Important: $\omega_i/(\zeta_i+\omega_i)$ typically not constant, depends on
  - steepness of $z_i(k)$-schedule
  - steepness of $f_i(k)$-schedule
  - In more realistic settings, it also depends on $\gamma_i(w_h,w_l,k)$

- Alternative view: labor/input–specific offshoring technology
  [ Grossman & Rossi-Hansberg (2008) ]
  - F.o.c. on *labor-specific* extensive margin $J_s$:

$$w_s^* = \frac{w_s}{\beta_s z_s(J_s)} \quad \text{for} \quad s = h, l \tag{24}$$

  - Zero profit conditions:

$$p_i = a_{ih} \cdot w_h S_h \left[J_h(w_h)\right] + a_{il} \cdot w_l S_l \left[J_l(w_l)\right] \quad \text{for} \quad i = 1, 2 \tag{25}$$

  - Simplification: Identical $S_h[\cdot]$ and $S_l[\cdot]$ for both industries
  - Composite terms $\{w_h S_h \left[J_h(w_h)\right]\}$ and $\{w_l S_l \left[J_l(w_l)\right]\}$ uniquely determined by $p_i$

- Globalization scenario: $\hat{\beta}_s < 0 \Longrightarrow \quad \hat{w}_s = \hat{\beta}_s - \zeta_s \hat{J}_s$
  - Wage effects:

$$\hat{w}_s = \frac{\omega_s}{\zeta_s + \omega_s} \hat{\beta}_s \quad \text{[ Pareto improvement ]} \tag{26}$$

  - Again in accord with insight from discrete unbundling
  - But different wage effects

# Comparing paradigms / approaches

- Discrete unbundling:
  - No strong assumptions (intensities, offshoring cost) $\Longrightarrow$ no strong result
  - Yet: Identifies general patterns of offshoring with unambiguous wage effects
  - Offshoring a discrete phenomenon, "regime" switch ("without ..." to "with ...")
- Continuous trade in tasks:
  - Strong assumptions ...
  - Strong results on wage effects ...
  - Offshoring with double margin (productivity effect on intensive margin)
  - Avoids extreme specialization effects (HO-type "hypersensitivity")
  - But maybe too continuous – unbundling *is* a discrete phenomenon

# Messages from comparative advantage of offshoring

- No unambiguous factor price (wage) effect from offshoring *in general*
- Yet: there are restrictions on what can happen $\Longrightarrow$ empirical implementation?
- Counter-intuitive results, but in line with established theory (on closer inspection)
- Important distinction:
  - Offshoring of value-added-slices (fragments, input bundles) vs.
  - Offshoring of tasks, separately for each factor (type of labor)
- Offshoring and wages jointly endogenous
  - Direction of co-movement dependent depends on type of exogenous shock
  - Reduction of offshoring costs vs. terms-of-trade shock
- Offshoring "first stages" vs. "mature offshoring"

# Offshoring and unemployment

- Concern: Unemployment effects $\Longrightarrow$ several options pursued so far:

  1. Minimum wage [ Kohler (2007) ]
  2. Fair wage constraint on wage setting [ Egger & Kreickemeier (2008) ]
  3. Matching/hiring frictions [ Keuschnigg & Ribi (2009) ]

  (1) and (2) amenable to unbundling approach, (3) better analyzed with task-trade approach [ Kohler & Wrona (2009) ]

- "Convex-hull-analysis": Minimum wage [ Kohler (2007) ]
  - "Freeing-up" of low-skill-intensive fragments
    - gain in both, lower unemployment and higher skilled wage
    - productivity effect shared by both types of labor (Pareto improvement)
  - "Freeing-up" of high-skill-intensive fragments:
    - high-skilled labor gains in terms of wages
    - low-skilled labor loses in terms of higher unemployment

- "Convex-hull-analysis": Fair wage constraint [ Egger & Kreickemeier (2008) ]
  - Without constraint – $w_l/w_h$ determined from slope of "hull" at $E_h/E_l$:

$$\frac{w_l}{w_h} = \omega(E_h/E_l) \quad \text{with } "\omega_E" < 0 \tag{27}$$

    * $\omega(E_h/E_l)$ stands for mapping from endowment space into factor-price-space
    * $\omega(E_h/E_l)$ not a on-to-one relationship with well-defined derivative
    * $\omega(E_h/E_l)$ is determined also by goods prices (small open economy)
  - With constraint: employment ratio shifted through unemployment rate $U$

$$U = f(\theta, w_h/w_l) \quad \text{with } f_w > 0 \tag{28}$$

$$\frac{w_h}{w_l} = \omega\left[\frac{E_h/E_l}{1 - f(\theta, w_h/w_l)}\right] \tag{29}$$

  - "Freeing-up" scenario with Pareto improvement analogous to minimum wage impossible
  - Again: the skill-intensity of the fragment retained domestically is important, relative to the endowment ratio
  - Grossly speaking: Increase in skill-premium and unemployment of low-skilled move in the same direction
  - Offshoring more likely to improve things in more egalitarian economies (other things equal)

- Remaining questions:
  - Where is the direct benefit of a productivity improvement on labor demand?
  - Where is the redistributive welfare state?

# Offshoring and the welfare state

- Urgent need to analyze offshoring in models that include the welfare state
- Two important concerns of the welfare state:
  - Provide unemployment insurance to correct for insurance market failure in the presence of risk-aversion
    - unemployment benefit
    - financed by income tax
  - Correct unequal income distribution $\Longrightarrow$ tax on rich (high-skilled) labor
- The effect of enhanced offshoring (lower $\beta$) on the welfare state depends on
  - the cause of unemployment
  - and how offshoring is modeled to have
    - unemployment effects and
    - income distribution effects

- Model of offshoring and the welfare state [ Keuschnigg & Ribi (2009) ]:
  - Mass $1$ of firms draw success probability $q \sim g(q)$
  - Technology involves final-good $x = f\left[y(h,l)\right]$ with 2 inputs:
    - High-skilled labor $h$ with given wage $r$ (opportunity cost)
    - Low-skilled option A: Offshoring on perfect foreign labor market with wage rate $w^*$ – share $s^o$ end up doing this
    - Option B: Hire domestic labor (out of mass $1$), with wage cost inflated by the cost of announcing/matching/hiring: $\kappa/m$ per employed worker

$$\beta w^* < W = w + \frac{\kappa}{m(\theta)} \quad \text{with } \theta = \frac{s^d k}{1} \tag{30}$$

      - Nash-bargaining on "take-away" wage $w$
      - Notice: open wage gap $W - \beta w^* > 0$ *in equilibrium*
      - Share $s^d$ of firms end up doing this
    - Important: Discrete view of offshoring on firm level

– Low-skilled labor employment
  * per unit of $y$: $\tilde{l}(r, W)$
  * total labor demand/employment $l = \tilde{l}(r, W)y$, from profit-maximizing $y$

$$e = s^d \cdot l(r, W) = s^d \cdot mk(r, W) \tag{31}$$

– Firm's expected operating profits

$$q \cdot \pi^o := \max_y \{f(y) - c(r, \beta w^s)y\} > q \cdot \pi^d := \max_y \{f(y) - c(r, W)y\} \tag{32}$$

– After drawing $q' \Longrightarrow$ cut-off-level of success probability $q^o$ from

$$q\pi^d = q\pi^o + f^o \quad \text{with } f^o \text{ fixed cost of offshoring technology} \tag{33}$$

– Share of domestic ($s^d$) and outsourcing ($s^o$) firms

$$s^d = \int_0^{q^o} qg(q)\mathrm{d}q \quad \text{and} \quad s^o = \int_{q^o}^1 qg(q)\mathrm{d}q \tag{34}$$

– Important: Continuity at the extensive margin of $q^o$, but not at the firm level

- Government:
  - providing unemployment benefit ($b$),
  - taxing high-skilled labor income ($T$), and
  - closing the budget through low-skilled labor tax ($\tau$)
- Risk-averse households:
  - High-skilled, fixed in number,
    - earning profits $s^d\pi^d + s^o\pi^o - F^o$,
    - with endogenous labor choice, distorted by $r - T$
  - Low-skilled labor with given mass 1, facing employment risk

– Globalization $\hat{\beta} < 0$:

  * Intensive margin: offshoring firms hire more *foreign* labor and make more profits $\pi^o$
  * Extensive margin: lower cut-off success probability $q^o$
    $\Longrightarrow$ more firms enter offshoring (higher $s^o$, lower $s^d$)
    $\Longrightarrow$ profit income $s^o\pi^o$ accruing to high-skilled increases
  * Extensive margin cuts into domestic low-skilled labor market
    $\Longrightarrow$ incipient lower labor market tightness $s^d k$ (no impact effect on $k$)
    $\Longrightarrow$ lower wage $w$, higher unemployment
    $\Longrightarrow$ higher fiscal cost of unemployment benefit
    $\Longrightarrow$ higher $\tau$ to close the budget

  Notice: Impact effect only through the extensive firm margin $s^d$

- Government reaction pattern:
  - If the shock occurs at a policy optimum: increase $T$, increase $b - \tau$
  - If the shock occurs in a non-optimal policy combination, there is a potential for a welfare enhancing shock absorption
  - Notice the importance of the existing policy distortions:
    - High-skilled labor: $T$ distorting the endogenous labor supply decision
    - Employment distortion (potentially, depending on relative bargaining power)
    - Low-skilled labor: participation tax rate $\tau^* := \tau + b$
  - Notice also: Keuschnigg & Ribi eschew looking at the trade policy option: tariff on offshoring

- Same welfare state, but alternative model of offshoring
  [ Kohler & Wrona (2009) ]:
  - Simplify by doing away with the extensive firm margin (firm homogeneity)
  - Introduce an extensive offshoring margin for the representative firm
    - Allow for offshoring of low-skilled task-trade
      [ applying Grossman & Rossi-Hansberg (2008) ]

$$\text{minimum unit-cost:} \qquad c\{r, W \cdot S[J(\beta)]\} \tag{35}$$

$$J(\beta) \text{ satisfying} \quad W = w + \frac{\kappa}{m(\theta)} = \beta z(J) w^* \tag{36}$$

    - Remarkable: same Nash-bargaining condition on take-away wage $w$
    - Notice no open wage gap at the margin $J$ !
  - $S[J(\beta)]$ is savings term from offshoring, as above in the task-trade models

- Low-skilled labor demand:
  - *Entire* demand per unit of $y$: $\tilde{l}\{r, W \cdot S([J(\beta)]\}$
  - *Domestic* low-skilled labor demand/employment is

$$e = [1 - J(\beta)] \cdot \tilde{l}\{r, W \cdot S[J(\beta)]\} \tag{37}$$

  - Notice: $\tilde{l}(\cdot)$ increases with lower $S$ (savings factor from offshoring)
- Two effects of globalization $\hat{\beta} < 0$:
  - Extensive margin of offshoring: higher $J(\beta)$ – analogy to lower $q^o$ before
  - Intensive margin of entire labor demand: higher $\tilde{l}\{r, W \cdot S[J(\beta)]\}$ [ on account of lower $S[J(\beta)]$ ]
- Intensive margin effect of second order: only for $J > 0$ and increases with $J$
- Intensive margin effect is analogous to $\omega/(\zeta + \omega)$ above
- Extensive margin effect is first order, governed by $\zeta$
- Intensive margin effect may dominate for sufficiently high initial value of $J$
- Depends on offshoring characteristics $z(k)$ and details of $x = f[y(h, l)]$
- Details explored in Kohler & Wrona (2009)

# Revisiting the skill premium

- Existing theoretical literature (mostly):
  - Skill premium largely independent of country size
  - I.r.s analyzed for "homothetic" technologies (e.g., home market bias)
- Empirical literature: high- / low-skilled = non-production / production workers
- At odds with stylized facts:
  - High-skilled production workers / low-skilled "white collar" workers
  - Production / non-production workers mostly variable / fixed cost
  - Yet, also scale economies in production work
  - Political interest: Manager / profit income vs. "productive" income

# Revisiting the skill premium

- Redefine skill-premium: manager-wage / production-wage
- Modify monopolistic competition model:
  - Fixed cost: managerial input
  - "Zero profit" condition: determines managerial wages (given supply)
  - Variable cost: production work
    - Continuum of tasks
    - External national scale economies on task level
      [ Grossman & Rossi-Hansberg (2009) ]

# Revisiting the skill premium

- Home market effect: size of home market elusive concept
  - Two types of labor in which to measure market size
  - Two different types of scale economies
  - Two types of wages / incomes
- Questions to be answered
  - Balanced size effects
  - Unbalanced size effects
  - Role of size with international task trade $\Longrightarrow$ multiple equilibria
    [ Ethier (1982) ]

# Does offshoring generate new trade policy issues?

- Offshoring all about comparative advantage $\Longrightarrow$ no genuinely new policy issues
- However, new issues may lurk in the "black box" of offshoring costs
- Second strand of literature on contractual imperfections looks into this box
- Antràs & Helpman (2004,2008) introduce double decision margin:
  - Outsourcing of incontractible input $\Longrightarrow$ "hold-up" problem with Nash-bargaining vs. vertical integration of the same input
    - $\Longrightarrow$ still "hold-up" problem, but with outside option of property right if Nash-bargaining fails
      $\Longrightarrow$ larger share of output to the firm
  - Do outsourcing or vertical integration domestically or offshore
  - Interesting empirical predictions [ Kohler & Smolka (2009) ]

- "Hold-up" problem as such has new policy implications [ Ornelas & Turner (2008), Antràs & Staiger (2008) ]
- Fundamental new distortion in trade:
  - Underinvestment ("hold-up" problem) in non-contractible inputs
  - If it arises exclusively on domestic / foreign sourcing $\Longrightarrow$ pure trade distortion (less or more than optimal level of input trade)
  - Pure trade distortion calls for trade policy instrument
- CASE I: Contractibility problem for domestic outsourcing, but not for offshoring
  - Underinvestment in provision of domestic input
  - Tariff on offshoring worsens the outside option for the domestic producer
  - Strategic distortion (from Nash-bargainig) alleviated

  [ Ornelas & Turner (2008) ]

- CASE II: Contractibility ("hold-up") problem for offshoring, but not for domestic outsourcing
  - Free trade has suboptimally low level of input trade
  - First best policy response: subsidize offshoring
  - Second best policy responses in a non-cooperative international policy environment: Use
    - subsidization of imported input plus
    - trade policy instrument (import tariff or export tax) on final good

    to achieve two goals
    - optimal level of input trade
    - shift surplus (in Nash bargaining) from foreign supplier to home buyer
  - New and enhanced rationale for international trade agreements

  [ Antràs & Staiger (2008) ]