MIDDLEMEN MARGINS AND GLOBALIZATION [1]

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Abstract

We develop a theory of effects of trade liberalization and outsourcing on inequality, via their impact on middleman margins in an experience good produced by unskilled labor with moral hazard in quality. North countries have a comparative advantage in a skill-intensive good. Trade liberalization causes unskilled wages and earnings inequality in the L sector in the South to rise. Free trade does not equalize factor prices: Northern intermediaries have an incentive to outsource to Southern suppliers. Outsourcing reduces inequality and raises unskilled wages in the South, with opposite effects in the North, but factor prices are still not fully equalized.

1 Introduction

Economists' views on globalization tend to contrast with popular perceptions that are based primarily on distributive implications, apart from concerns about environmental issues or labor standards. While the general perception is that globalization increases inequality, economists tend to argue (on the basis of the Stolper-Samuelson Theorem) that globalization should reduce inequality and poverty in poor or middle income countries with comparative advantage in low-skilled labor-intensive goods. Moreover, it is argued that all countries should gain from trade in the aggregate, though particular sectors or factors could lose. These predictions are in stark contrast to a widespread perception in Latin American countries in particular that globalization has neither helped growth nor reduced inequality. In these respects the East Asian and Chinese experience appears to be different: fast growth was accompanied by export expansion and substantial poverty reduction. The causes of differences between East Asia and Latin America are however not well understood.

Empirical studies also fail to show much support for the Stolper-Samuelson predictions, particularly in the Latin American context. Numerous studies indicate absence of any tendency for globalization to be accompanied by narrowing of wage inequality in many poor and middle income countries, and in many instances an increase instead (e.g., Feenstra and Hanson [1996], Hanson and Harrison [1999], Winters, McCulloch and McKay [2004], Goldberg

and Pavcnik [2007]). Wood [1997] reviews the experiences of many different developing countries and argues there were important differences between Latin America and East Asian countries with respect to trends in wage inequality since the late 1970s. Winters, McCulloch and McKay [2004] provide an overview of the more recent literature on this topic and argue that human capital and infrastructure differences can possibly account for contrasting reactions of wage differentials to trade openness in East Asia and Latin America. Baliamoune-Lutz and Ndikumana [2007] provide cross-country evidence in favor of the hypothesis that the growth impact of trade liberalization in a cross-section of African countries varied sharply with institutional quality.

In this paper we describe one possible channel by which trade can increase inequality in developing countries, despite the fact that they are unskilled-labor-abundant. It is based on the fact that many producers of farm goods or unskilled-labor-intensive goods cannot sell directly to consumers: they sell to middlemen or intermediaries instead. The existence of middlemen margins creates a gap between consumer (or border) prices and producer (or farmgate) prices. Feenstra [1998] provides an illustration of the magnitude of these margins: a Barbie doll which is sold to US customers for $10 returns 35 cents to Chinese labor, 65 cents covers the cost of materials, and $1 for transportation, profits and overhead in Hong Kong. Mattel, the US retailer earns at least $1 per doll. The remaining covers transportation, marketing, wholesaling and retailing in the U.S. Feenstra and Hanson [2004] show that Hong Kong markups on re-exports of Chinese goods totaled 12% of

its GDP, while manufacturing accounted for only 6%. The average markup rate accruing to Hong Kong intermediaries on re-exported Chinese goods was 24%. They show that these markups varied across product categories consistent with information-based theories of intermediation and with the existence of international outsourcing networks.

In such a context, increases in prices of export goods would be divided between middlemen and producers. If the former gain more, export growth will be accompanied by increased inequality (between intermediaries and producers) and low trickle down to ultimate producers. [2] We construct a competitive theory of trading intermediation with endogenous margins, which is then embedded in an open economy general equilibrium context.

In order to develop a theory of middlemen margins, one needs to address a prior question: why are there middlemen in the first place? Our model, closely related to Biglaiser and Friedman [1994], is based on a moral hazard problem with regard to quality. Producers have an incentive to make short-term gains from skimping on quality, which customers will not be able to recognize at the point of sale, but only afterwards when they consume the good. Quality assurance is based on brand-name reputation of the seller, which is destroyed in the event of supply of low quality goods. Reputational considerations naturally create economies of scale: high-volume sellers have more at stake if their reputations are destroyed. This creates endogenous entry-barriers into the intermediary trade: we extend the Biglaiser-Friedman model to incorporate these. Heterogeneity in entrepreneurial, marketing or

finance skills determines which firms enter and the scale at which they operate. We represent these skills by a single parameter of entrepreneurial ability. We adapt the model of Lucas [1978] where the size distribution of firms is determined by the underlying distribution of entreprenurial ability in the economy. While it can represent the distribution of natural abilities, it also includes the effects of underlying wealth distributions and social networks that facilitate access to finance and marketing channels.

An additional ingredient in the model is that firms selling to final customers select between two forms of business organizations: *family businesses* that produce the good themselves, and *retail intermediaries (or capitalist firms)* that procure the good from suppliers (or employ workers). The advantage of a family business is that it avoids agency costs inherent in outsourcing or supervision of hired workers that intermediaries have to encounter. The disadvantage is that the scale of a family business is inherently limited owing to the reliance on family labor. This is analogous to the distinction between family farms and capitalist farms based on hired labor in the theory of Eswaran and Kotwal [1986]. We derive equilibrium composition of the industry between two kinds of businesses; intermediary margins and producer prices are competitively determined. Suppliers, family businesses and retail intermediaries all earn incentive rents, which cascade across different 'layers'. These rents play a crucial role in determining the distributional implications of trade liberalization, outsourcing or direct foreign investment. In particular, they prevent factor price equalization across developed and developing

countries, and may cause the Stolper-Samuelson logic to be overturned.

Our model has one other good (called the C-good) which uses skilled and unskilled labor, and involves no agency problems in production or marketing. Developed countries (DCs) are more abundantly endowed with skilled labor, hence have a comparative advantage in the C-good. Trade liberalization generates increased export demand for the experience good (which we call the L-good) produced in LDCs, from consumers in DCs. This raises the retail price as well as middlemen margins in the L-good sector in LDCs, inducing firms to switch from family businesses to intermediation.

The distribution of entrepreneurial ability in the neighborhood of the threshold between the two forms of business determines the extent of new entry into intermediation. In countries where the distribution is 'thick' in the middle ranges, there is a lot of new entry and resulting output expansion in the L-sector. In such countries middlemen margins do not increase much; most of the benefits of increased exports trickle down to suppliers and employed workers. In contrast, the supply response of the L-sector is weak in countries without a thick middle class of entrepreneurs — most of the increased export demand flows into higher middlemen margins rather than increased production. The effects of trade liberalization on growth and earning inequality in the L-sector thus depend on the underlying distribution of entrepreneurial 'ability'.

The economy-wide impact of trade liberalization is the result of these changes in the export sector, in addition to standard Stolper-Samuelson ef-

fects on skill premia in the C sector. There is a tendency for factor prices to move closer, but they do not get completely equalized. Middlemen margins are higher in LDCs owing to the trade-induced expansion in the L-sector. This implies that prices paid to suppliers or workers in the L-sector and unskilled wages in the C-sector are lower in LDCs even in the absence of any barriers to trade.

Classical results concerning welfare effects of trade can also get overturned in this setting. In our model, the choice of organizational form by L-sector entrepreneurs involves a pecuniary externality: a switch to intermediation from family businesses creates 'good jobs' or incentive rents that benefit hired workers and suppliers. Trade openness results in expanded intermediation in the L-sector in LDCs: hence there is an added welfare benefit in their case, over and above the conventional gains from trade. In DCs by contrast, there is less intermediation as the L-sector shrinks, resulting in a loss of 'good jobs'. This results in a welfare loss, which could overwhelm the traditional gains from trade. In particular, starting from autarky a small lowering of trade barriers will cause aggregate welfare to decline in DCs.

The lack of factor price equalization creates incentives for retail intermediaries in DCs to outsource to suppliers located in LDCs, or shift their factories to LDCs in order to take advantage of lower unskilled wages. The effects of such outsourcing on inequality can differ markedly from those of trade liberalization. For instance, in the case where effects on terms of trade are negligible (i.e., when the countries concerned are small relative to the

world economy), we show that outsourcing shrinks middleman margins in LDCs and expands them in DCs. Domestic intermediaries in LDCs shrink, while intermediaries in DCs expand and form multinational enterprises producing in LDCs and selling world-wide. The expansion of supply contracts or 'good jobs' in LDCs is accompanied by rising unskilled wages; the opposite happens in DCs. With no barriers to outsourcing, supplier prices and wages in the L-sector are equalized across countries. But full factor-price equalization still does not obtain: unskilled wages in the C-sector remain lower in LDCs. Of course, outsourcing raises these wages, but they stop short of full equalization.

Alternative theories of outsourcing and effects on inequality have been provided by Antras, Garicano and Rossi-Hansberg [2006], Feenstra and Hanson [1996] and Kremer and Maskin [2003]. Of these, the most closely related to ours is Antras *et.al*, who develop a model in which agents of heterogenous abilities sort into hierarchical teams. Their model extends Kremer and Maskin's model in a variety of directions. Inequality rises in the South in their model owing to the matching of high ability agents in the South with worker teams from the North. The main differences are the following. Our theory includes two goods and thus allows an analysis of effects of trade liberalization as well as outsourcing. It also includes an analysis of composition of firms between those based on self-employment and and hierarchical contracting. Rents arise owing to moral hazard and reputational effects, rather than matching of heterogenous agents. These have different implications for

effects of outsourcing, which results in factor price equalization in their model but not in ours. Our theory predicts unskilled wages will remain lower in developing countries even in the absence of any impediments to trade or outsourcing. Moreover, their theory predicts that outsourcing raises inequality in the South, whereas our model predicts that the overall effect can go either way. [3]

Section 2 introduces the model. Section 3 describes the equilibrium of the L-sector and comparative statics with respect to the L-good price. Section 4 describes the economy-wide equilibrium and the effects of trade liberalization. Section 5 describes the effect of outsourcing. Finally Section 6 concludes.

2 Model

There are two goods: a skill intensive good C, and an unskilled labor intensive good L. Good C requires skilled and unskilled labor to produce; Cobb-Douglas production function $X_C = L_C^{\beta} H_C^{1-\beta}$ where L_C, H_C denote unskilled, skilled labor inputs respectively. The production of good L requires only unskilled labor. A unit of good L can be of either high or low quality: one unit of high (resp. low) quality good L requires one (resp. z) unit of labor, where $1 > z > \frac{1}{2}$. The assumption that $z < 1$ ensures there is a moral hazard problem, while $z > \frac{1}{2}$ ensures (along with the assumption that each agent inelastically supplies one unit of labor) that an agent can produce a maximum of one unit of the L-good of either high and low quality.

An exogenous fraction σ of agents are skilled, low enough in all countries that skilled wages exceed unskilled wages or returns in the L-sector. Hence skilled agents will always prefer to work as skilled workers in the C sector. Remaining agents choose either to work as unskilled workers in C sector, or in the L sector.

Each agent supplies one unit of labor inelastically: this will be allocated between different occupations. Agents lacking skills for the C sector have heterogenous ability in managing a firm in the L sector, represented by parameter a, which is the largest firm size (or sales of L good) this agent can manage (akin to the Lucas theory of firm size distribution). a could also represent access to finance or marketing skill or other key input (such as land) needed to produce the L-good in combination with unskilled labor. There is a given distribution of a in the population, represented by c.d.f. $G(a)$ on the support $[0, \bar{a}]$.

There are two kinds of L-sector firms that sell the L-good to customers: *family businesses* and *retail intermediaries*. Family businesses produce the good themselves, and are therefore limited in scale: they can only produce one unit of the good. Intermediaries outsource production to suppliers or workers and encounter agency problems in ensuring high quality supply. But they can sell more than one unit of the good: their sales volume is limited only by the entrepreneur's ability a. Clearly, only agents with $a > 1$ will prefer to form an intermediary firm rather than family business. It will be convenient to assume in addition that to run either kind of business, a

minimum endowment of ability $\underline{a} > 0$ is required of the entrepreneur. This assumption rules out the possibility of family businesses of arbitrarily small size, and thus ensures the existence of a pool of agents in the economy (with $a < \underline{a}$) that cannot become entrepreneurs). Such agents must therefore either work as unskilled workers in the C-sector, or as suppliers in the L-sector to some intermediary firm. Agents with $a \geq \underline{a}$ on the other hand can choose either to be an L-supplier, run a family business, or an intermediary firm in the L-sector.

We also seek to avoid complications from the possibility that some agents may mix occupations. In particular, we shall assume that supervision of suppliers takes enough time that an intermediary has no time left over for working in production in either L or C sectors. Hence entrepreneurs must either choose between a family business and becoming an intermediary: they cannot do both (i.e., they cannot produce some of their good themselves and outsource the rest).

The moral hazard problem is that the quality of the L good supplied cannot be observed at point of sale; customers identify quality at the time they consume the good. We assume that low quality good generates no utility at all to customers: they have identical Cobb-Douglas preferences over consumption of the C good and high quality L good. Producing a unit of the low quality L good requires only z units of time of a worker's time, allowing the remaining $1 - z$ time to be allocated to working in the C sector. If a supplier supplies the good to an intermediary, the latter cannot monitor

the quality of the good at the time it is delivered. However the quality will become known later when the good is sold to a customer. The effect of low quality on the intermediary's reputation is such that the intermediary will design supply contracts so as to ensure that high quality supply is incentive compatible for suppliers.

This requires suppliers to be paid adequate incentive rents. Supplier discipline is provided by the fact that low quality supply will result in termination of the supplier's contract (as the intermediary's reputation will be destroyed). We use a model akin to that of Shapiro and Stiglitz [1984]. Unskilled agents with low entrepreneurial ability will queue for supply contracts or 'good jobs' in the L-sector with intermediary firms. The market for unskilled work in the C-sector pays no rents, and therefore always clears. Those winning a supply contract get paid a price higher than C-sector unskilled wages, so that renewal of these contracts provides the incentives for them to provide a high quality L-good. A random fraction h of these supply contracts get terminated for exogenous reasons, and are filled from those queuing for these contracts.

The incentive problem also arises in marketing. A family business has a short-term incentive to supply a low quality L-good, in order to divert time to working in the C-sector. An intermediary has a similar incentive to procure a low-quality L-good at a lower supply price than the prevailing rent-inclusive supply price for a high-quality L-good. Selling a low quality good will result in destruction of the firm's reputation. We assume that any firm selling a

low quality good to any consumer loses its brand-name reputation in the following period, and can never sell the L-good ever again to any consumer. The entrepreneur must subsequently work either as an unskilled worker in C sector, or as a supplier in the L sector. To overcome the moral hazard problem, intermediaries and family business must also earn incentive rents. For intermediaries, these rents take the form of middleman margins, the gap between the retail price and the price they pay their suppliers.

The trade-off between family businesses and intermediaries then reduces to this. Family businesses are characterized by only one layer of incentive rents, the result of a single moral hazard problem in marketing. Intermediaries are characterized by two layers of incentive rents, owing to the double moral hazard problem in production as well as marketing. Intermediaries incur higher procurement or production costs than family businesses. This causes their moral hazard problem in marketing to be more severe than for family businesses. This is compensated by the larger scale on which they can operate. The consequences of a destroyed reputation for the entrepreneur are the same irrespective of ability, being condemned thereafter to the status of a supplier/worker for ever thereafter. A larger scale of business of an intermediary implies that the latter has more to lose from destruction of reputation. This creates a natural reputational scale economy. The intermediary form of business organization is therefore preferred by entrepreneurs with large ability, while family businesses are selected by those of lower ability.

3 L sector equilibrium

We start by describing equilibrium firm composition and middleman margins in the L sector, taking output prices and wages as given. In the next section we shall embed this in a general equilibrium model where these prices and wages will be endogenously determined.

We use the following notation. The price of the C-good P_C is normalized to unity. P_L denotes good L price, and w the unskilled wage in sector C. The price paid by intermediaries to suppliers $\tilde{P}_L$ will be endogenously determined in the L-sector equilibrium.

The relevant incentive constraints will involve the ratio of L-good prices to the wage $p \equiv P_L/w$ and $\tilde{p} \equiv \tilde{P}_L/w$. Let V_u denote the present value utility of an 'unemployed' agent who does not run a business and does not have a supply contract currently. V_h will denote the present value utility of an agent that does have a supply contract. Also, let $v_u \equiv V_u/w$ and $v_h \equiv V_h/w$. $\delta \in (0,1)$ denotes the discount factor of all agents.

3.1 Incentive Constraints

The incentive constraint pertaining to the marketing moral hazard problem for a family business is:

$$\frac{p}{1-\delta} \geq p + (1-z) + \delta v_u.$$

The left-hand-side is the present value profit of supplying a high quality unit. The right-hand-side is the value of supplying a low quality unit, which

allows the producer to supplement earnings by working part-time in the C-sector, but results in a loss of reputation from the next period onwards. This constraint reduces to

$$p - (1-\delta)v_u \geq (1-\delta)(1-z)/\delta.$$

In the discussion that follows, we shall assume this constraint is satisfied; Proposition 1 will describe the consequences of it not being satisfied.

The corresponding incentive constraint for an intermediary with ability a is:

$$\frac{(p-\tilde{p})a}{1-\delta} \geq (p-z)a + \delta v_u.$$

which reduces to

$$p - \tilde{p} - (1-\delta)v_u/a \geq (1-\delta)(\tilde{p}-z)/\delta.$$

This follows from the fact that it is optimal for an intermediary to expand scale of production to the maximum level a. Moreover, if the intermediary wants to sell low quality goods to customers, it can be procured at cost z from suppliers.

In order to provide suppliers the incentive to supply high quality goods, $\tilde{p} > 1$. This implies that an intermediary incurs higher procurement cost of high quality than the production cost of a family business. It then gains more immediately by deviating to low-quality supply. Therefore for an entrepreneur with $a = 1$, the incentive constraint is more difficult to satisfy compared with a family business. At unit scale of production, family businesses are more trustworthy.

This disadvantage of intermediation is countered at higher values of a: larger volumes means that an intermediary has more to lose in terms of future profitability by losing reputation. This implies there is a minimum scale a_R at which intermediaries' incentive constraint is satisfied: the solution to

$$p - \tilde{p} - (1-\delta)v_u/a_R = (1-\delta)(\tilde{p} - z)/\delta,$$

if

$$p - \tilde{p} - (1-\delta)v_u/\bar{a} > (1-\delta)(\tilde{p} - z)/\delta.$$

Otherwise, intermediaries cannot operate at any scale and we can set $a_R = \bar{a}$.

The relative profitability of the two forms of business also depends on the entrepreneur's ability: higher ability translates into higher scale and profits for intermediaries. The minimum ability at which an agent prefers to become an intermediary rather than operate a family business is given by $\tilde{a} = \frac{p}{p-\tilde{p}}$.

Define $a^* \equiv \max\{\underline{a}, \tilde{a}, a_R\}$. An agent with ability $a \geq \underline{a}$ will become an intermediary if and only if $a \geq a^*$.

Agents with $a < \underline{a}$ will search for supply contracts with intermediaries in the L-sector, and work as unskilled workers in the C-sector until they are successful in securing a supply contract.

Agents with ability between $\underline{a}$ and a^* will prefer to operate a family business than become a supplier to some intermediary. This follows from the fact that $p > \tilde{p}$ in order to ensure that the incentive constraint for intermediaries is satisfied.

Therefore in the case that prices are such that the incentive constraint for family business is satisfied, the occupational pattern will be:

(i) those above a^* become intermediaries

(ii) those between $\underline{a}$ and a^* will run a family business,

(iii) those below $\underline{a}$ will either become suppliers of the L good to intermediaries, or work as unskilled workers in the C sector

Now turn to incentives of suppliers. As in Shapiro-Stiglitz [1984], any existing supply contract is terminated for exogenous reasons with probability h, creating scope for new supply contracts to be filled by those looking for such contracts. Contracts are also terminated if a supplier provided a low quality item, since the corresponding intermediary's reputation will be destroyed. Supplier incentives are provided by these termination threats, combined with incentive rents. Owing to these rents, agents with a below $\underline{a}$ will prefer to be a supplier in L sector than work in C sector. Supply contracts will therefore have to be rationed: there will be more low-a agents looking for such contracts than the number of such contracts actually offered by intermediaries.

In the Shapiro-Stiglitz equilibrium, all intermediaries offer suppliers the lowest supply price consistent with their incentive to provide high quality:

$$\tilde{p} = z + \frac{1-z}{\delta(1-h)(1-\phi)},$$

where ϕ is the probability that any supplier without a contract can find a new supply contract with a intermediary in any given period.

The corresponding value V_u of being 'unemployed' is calculated from the following simultaneous equations for value of having and not having a supply contract for a low-a agent:

$$V_h = \tilde{P}_L + \delta[(1-h)V_h + hV_u]$$

$$V_u = \phi V_h + (1-\phi)[w + \delta V_u]$$

In addition, the lowest supply price at which supplier's incentive constraint is met is given by

$$\tilde{P}_L = (1-\delta)V_u + \frac{(1-\delta(1-h))(1-z)}{\delta(1-h)}w.^4$$

Solving, we obtain:

$$\tilde{P}_L = w[z + \frac{1-z}{\delta(1-h)(1-\phi)}].$$

$$(1-\delta)V_u = \tilde{P}_L - \frac{(1-\delta(1-h))(1-z)}{\delta(1-h)}w$$

$$(1-\delta)V_h = \tilde{P}_L - \frac{h(1-z)}{1-h}w$$

Dividing through by w, we obtain

$$\begin{aligned} \tilde{p} &= z + \frac{1-z}{\delta(1-h)(1-\phi)} \\ (1-\delta)v_u &= \tilde{p} - \frac{1-\delta(1-h)}{\delta(1-h)}(1-z) \\ (1-\delta)v_h &= \tilde{p} - \frac{h(1-z)}{(1-h)} \end{aligned}$$

Define the 'tightness' k of the market for supply contracts to be the ratio of offered supply contracts (i.e., scale of output of intermediary sector $\int_{a^*}^{\bar{a}} adG(a)$) to the set of low-$a$ agents seeking supply contracts:

$$k \equiv \frac{\int_{a^*}^{\bar{a}} adG(a)}{G(\underline{a})}$$

This determines ϕ:

$$\phi(k) = \frac{hk}{(h-1)k+1}.$$

The industry equilibrium is constructed as follows, taking p as given. Start with a given k, find corresponding $\phi(k)$, supply price $\tilde{p}(k)$, value of being unemployed $v_u(k)$, intermediary threshold $a^*(p,k) \equiv \max\{\underline{a}, \frac{p}{p-\tilde{p}(k)}, a_R(p,k)\}$, which in turn determines

$$k'(p,k) \equiv \frac{\int_{a^*(p,k)}^{\bar{a}} adG(a)}{G(\underline{a})}$$

and finally we impose the fixed point requirement:

$$k'(p,k) = k.$$

Note that $\phi(k), \tilde{p}(k), v_u(k)$ are increasing; hence $a_R(p,k)$ is non-decreasing in k, and so is $a^*(p,k)$ non-decreasing in k. Therefore the number of supply contracts offered $\int_{a^*(p,k)}^{\bar{a}} adG(a)$ is non-increasing, and $k'(p,k)$ is non-increasing in k. This implies that a fixed point $k(p)$ if it exists, is unique: denote this by $k(p)$.

Since higher p raises middleman margins for given k, it makes the incentive constraint for intermediaries easier to satisfy at any given a. It also in-

creases relative profitability of intermediation over family business, so $a^*(p,k)$ is non-increasing in p, implying that $k(p)$ is non-decreasing.

Intuitively, higher p raises size of the intermediary sector, increasing scale of production of the L good (as intermediaries operate at a larger scale than family businesses). This raises demand for supply contracts, and the tightness in the market for supply contracts. This in turn raises supplier price $\tilde{p}$, and ϕ, number of supply contracts or 'good jobs' — the key trickle-down mechanism in the model.

We summarize preceding observations and also settle question of existence of equilibrium in the L-sector.

Proposition 1 *There is a unique L-sector equilibrium, for any given* $p \equiv \frac{p_L}{w}$. *This equilibrium is described as follows. Define* $p_F(k)$ *and* $p_R(k)$, *minimum output prices (relative to the wage rate) that allow incentive constraints of family businesses and intermediaries (at* $\bar{a}$*) to be satisfied:*

$$p_F(k) \equiv (1-\delta)v_u(k) + (1-\delta)(1-z)/\delta$$

and

$$p_R(k) \equiv \frac{(1-\delta)(\tilde{p}(k)-z)}{\delta} + \tilde{p}(k) + 1/\bar{a}$$

Then:

(a) If $p < p_F(0) \equiv 1 + \frac{1-\delta}{\delta}(1-z)$ *the L sector does not operate, aggregate supply of the L good is* $X_L(p) = 0$ *and* $L_C(p)$, *supply of labor in the C sector, is* $(1-\sigma)$.

(b) If $p_F(0) \leq p \leq \max\{p_R(0), \tilde{p}(0)\bar{a}/(\bar{a}-1)\}$*, only family businesses operate: all agents with* $a < \underline{a}$ *work in the C-sector, and others operate family businesses. Here* $X_L(p) = (1-\sigma)(1-G(\underline{a}))$ *and* $L_C(p) = (1-\sigma)G(\underline{a})$*.*

(c) If $p > \max\{p_R(0), \tilde{p}(0)\bar{a}/(\bar{a}-1)\}$*, family businesses and intermediary firms co-exist: all agents with* $a < \underline{a}$ *work as suppliers or C-sector workers; those with* a *between* $\underline{a}$ *and* $a^*(k_F(p), p))$ *operate family businesses, and all those with* a *above* $a^*(k_F(p), p))$ *operate intermediary firms (where* $k_F(p)$ *denotes the unique fixed point of* $k'(p,k) = k$*). In this region* $X_L(p) = (1-\sigma)[G(a^*(k_F(p), p)) - G(\underline{a}) + \int_{a^*(k_F(p),p)}^{\bar{a}} adG(a)]$ *and* $L_C(p) = (1-\sigma)(1-k_F(p))G(\underline{a})$*.*

The equilibrium is depicted in Figure 1. For prices below $p_F(0)$, the L-sector shuts down as the incentive constraints cannot be satisfied for either kind of firm for any value of k. When $p \geq p_F(0)$, the incentive constraint for family business is satisfied at $k = 0$. If p is less than $\max\{p_R(0), \tilde{p}(0)\bar{a}/(\bar{a}-1)\}$ at the same time, there cannot be any intermediaries, either because their incentive constraints are not satisfied, or they are less profitable than a family business. In this price range, k will equal 0. Hence only family businesses will function. Once p is at or above $\max\{p_R(0), \tilde{p}(0)\bar{a}/(\bar{a}-1)\}$, intermediaries enter. Then family businesses and intermediaries co-exist. As p rises within this range, the threshold ability for an intermediary falls, and some family businesses switch to intermediation. This is accompanied by expansion of output of the sector, since intermediaries operate at larger scales than family

businesses.

3.2 Comparative Statics of L-sector equilibrium

The interesting region corresponds to where intermediaries operate. Here we can work out comparative statics of an increase in p on intermediary margins and inequality within the L-sector. We work out effects on returns relative to w, the returns from working in the C-sector as an unskilled worker. As we shall show later, an increase in p will cause the unskilled wage w to rise, so the result below implies an increase in absolute returns in the L-sector as well.

Proposition 2 *Consider p above $\max\{p_R(0), \tilde{p}(0)\bar{a}/(\bar{a}-1)\}$ where intermediary firms operate. Suppose p increases. Then relative to w:*

(i) both supply price $\tilde{p}$ and middleman margin $p - \tilde{p}$ increase, but the proportionate increase in the latter is higher (so the intermediary markup rate $1 - \frac{\tilde{p}}{p}$ increases);

(ii) a^* falls, i.e., some family businesses convert to intermediation, increasing both average firm size and k, the tightness in the market for supply contracts;

(iii) The increase in supplier returns ($\Delta\tilde{p}$) is less than the increase in returns of family businesses (Δp), which in turn is less than the increase in returns ($\Delta[(p - \tilde{p})a]$) of any intermediary with $a \geq a^*(k_F(p), p)$.

The change in earning patterns across different ability levels is depicted in Figure 2. Earning inequality within the L-sector increases in the sense that higher ability agents obtain higher increases in returns. The supply price rises, making suppliers better off. But this increase is less than the rise in the consumer price of the L-good, since middleman margins rise (which we may recall from Proposition 1 occurs as the price rise of the L-good induces greater entry into intermediation). The supply response of the L-good sector to the price rise involves a set of agents with intermediate ablities switching from the family business form to intermediation. This requires middleman margins to rise. This limits the trickle down of the price increase to suppliers, and implies that earnings of family businesses rise more than that of the suppliers. The rise in the middleman markup rate $(p - \tilde{p})/p$ ensures that the returns of family businesses in turn rise less than those of incumbent intermediaries.

It is also interesting to note the role of the ability distrbution $G(.)$ in determining the response of the L-sector to a rise in p. Let $k_F(p)$ be denoted by $k(p)$ from now on. Note that in equilibrium $\tilde{p}(p) = \tilde{p}(k(p))$, implying that

$$\frac{\partial \tilde{p}}{\partial p} = \frac{1}{(1-h)} \phi'(k(p)) k'(p)$$

which reduces to

$$\frac{\partial \tilde{p}}{\partial p} = \frac{1}{1-h} \frac{h}{[1-(1-h)k(p)]^2} A^*(p)[-A^{*\prime}(p)] \frac{g(A^*(p))}{G(\underline{a})}$$

where $A^*(p)$ denotes the equilibrium ability threshold $a^*(k(p), p)$ for intermediation, and $g(.)$ denotes the density of G.

Therefore $g(A^*(p)) = 0$ implies that $\tilde{p}$ will not increase at all when p increases: then there is no new entry into the intermediary sector. This is the case where the distribution of a is polarized into a high region and a low region, and A^* falls in between these two regions. The size distribution of firms is polarized between a set of large intermediary firms, and another set of small family businesses, with no entry or exit between these two sectors. The increased consumer price of the L-good is translated entirely into an increase in the middleman margin, with no trickle-down to suppliers at all. Trickle-down requires an increase in the demand for suppliers from intermediaries, and therefore increased entry into intermediation. There must be enough middle sized firms that move out of the family business sector into the intermediary sector. This suggests a reason why East Asia with a larger 'middle class' will experience more growth in the L-sector owing to increase

in p resulting from growing export markets, compared with Latin America where the distribution of land or entrepreneurship is more polarized.

Another distributional effect is interesting, which may correspond to the Latin America-East Asia distinction. Increased supply of public schooling could be associated with a larger fraction of poor (i.e., low-a) agents able to move into the skilled occupation in the C sector. The extreme version of this is where public schooling provides C-sector skills only to a fraction of agents with ability below $\underline{a}$. [5] This corresponds to a rise in σ and a fall in $G(\underline{a})$, while the density above $\underline{a}$ is unaffected. This causes $k(p)$ function to shift upwards, raising equilibrium $\tilde{p}(p) = \tilde{p}(k(p))$, and thus lower middleman margins.

The effect on the marginal 'pass-through' rate $\frac{\partial \tilde{p}}{\partial p}$ is however difficult to sign. Note also that the effect of a mean-preserving increase in spread of a is also difficult to assess, as this increases both the demand for and supply of suppliers in the L-sector.

4 General Equilibrium

We start with the autarkic economy. Let X_C, X_L denote the aggregate supply of C and L goods respectively. We shall use the C-good as numeraire. We have seen above that the L-sector equilibrium depends only on $p \equiv \frac{P_L}{w}$; hence $X_L = X_L(p)$. p also determines supply of unskilled labor $L_C(p)$ to the C sector, and therefore

$$X_C(p) = L_C(p)^{\beta}\sigma^{1-\beta} \tag{1}$$

The aggregate income of the economy is:

$$Y(p, P_L) \equiv X_C(p) + P_L X_L(p) \tag{2}$$

Let α_L denote the constant expenditure share of consumers for the L good. The condition for the L market to clear is:

$$\alpha_L Y(p, P_L)/P_L = X_L(p). \tag{3}$$

Equation (1) implies the market clearing condition (3) reduces to

$$\alpha_L \frac{L_C(p)^{\beta}\sigma^{1-\beta}}{P_L} - (1-\alpha_L)X_L(p) = 0. \tag{4}$$

We can solve for P_L as a function of p from the condition that unskilled wage in C sector $w \equiv \frac{P_L}{p}$ equals marginal product:

$$P_L = p\beta[\frac{\sigma}{L_C(p)}]^{1-\beta}. \tag{5}$$

Inserting (5) into (4), we obtain the condition for equilibrium in the autarkic economy in terms of p alone:

$$\alpha_L \frac{Y(p, P_L)}{P_L} - X_L(p) = \frac{\alpha_L}{\beta}\frac{L_C(p)}{p} - (1-\alpha_L)X_L(p) = 0. \tag{6}$$

This presumes that the p that solves (6) exceeds $p_F(0)$, so that the family business sector operates in the L-sector. This requires the condition that

$$\frac{\alpha_L}{\beta}\frac{L_C(p_F(0))}{p_F(0)} > (1-\alpha_L)X_L(p_F(0)). \tag{7}$$

It is easily verified that this reduces to the condition

$$\frac{\alpha_L}{1-\alpha_L}\frac{G(\underline{a})}{1-G(\underline{a})} > \beta[\delta + (1-\delta)(1-z)]/\delta. \tag{8}$$

Note that given Cobb-Douglas preferences of consumers, the L-sector must deliver positive output in equilibrium. When (8) is violated, the equilibrium will involve $p = p_F(0)$ and rationing of family business firms: a positive fraction of entrepreneurs with a above $\underline{a}$ will function as family businesses, just enough to meet consumer demand at $p = p_F(0) \equiv 1 + \frac{1-\delta}{\delta}(1-z)$. [6] Note finally that competitive equilibrium is unique because $\frac{L_C(p)}{p}$ is decreasing in p, while $X_L(p)$ is nondecreasing.

Proposition 3 *Consider the autarkic economy. There is a unique competitive equilibrium. When (8) holds, p is obtained from solving (6); otherwise* $p = p_F(0) \equiv 1 + \frac{1-\delta}{\delta}(1-z)$, *supply in the L good sector is rationed and output is demand-determined. Given the equilibrium p,* P_L *is then obtained from (5). The equilibrium p is independent of* σ, *while* P_L *is increasing in* σ.

This result implies the following differences across countries in autarky. Suppose there are two countries N and S, identical in all respects, except that N has more skilled labor: $\sigma^N > \sigma^S$. Then in autarky, p is the same in

N and S, so is the composition of L sector between different types of firms. Suppliers in the L-sector receive a higher price P_L in N, and unskilled wages in the C-sector $w \equiv \frac{P_L}{p}$ are also higher.

S will have a comparative advantage in the L good: if trade barriers fall, S will tend to export the L good and import the C good. We now turn to the effects of trade.

4.1 Open Economy: Effects of Trade Liberalization

Now suppose trade barriers disappear altogether between countries N and S. We shall compare the free trade outcome with the autarkic outcomes in the two countries, noting that similar results obtain concerning a small reduction in trade barriers.

Define national income in country i:

$$Y^i(p^i, P_L) \equiv X_C^i(p^i) + P_L X_L^i(p^i). \tag{9}$$

Then the market clearing condition with free trade is

$$\alpha_L[Y^S(p^S, P_L) + Y^N(p^N, P_L)]/P_L = X_L^S(p^S) + X_L^N(p^N) \tag{10}$$

where

$$P_L = p^S \beta(\sigma^S / L_C^S(p^S))^{1-\beta} = p^N \beta(\sigma^N / L_C^N(p^N))^{1-\beta}. \tag{11}$$

To solve for free trade equilibrium, invert (11) to obtain $p^i \equiv p(\sigma^i, P_L)$ which is decreasing in σ^i and increasing in P_L. Then insert this in (10) to

obtain an equation in P_L alone:

$$\frac{\alpha_L}{\beta}[\frac{L_C^S(p(\sigma^S,P_L))}{p(\sigma^S,P_L)}+\frac{L_C^N(p(\sigma^N,P_L))}{p(\sigma^N,P_L)}]-(1-\alpha_L)[X_L^S(p(\sigma^S,P_L))+X_L^N(p(\sigma^N,P_L))=0 \tag{12}$$

As P_L increases, $p(\sigma^i,P_L)$ increases, $\frac{L_C}{p}$ falls in both countries, while aggregate production of the L good is nondecreasing. Hence there is a unique free trade equilibrium; existence follows from arguments similar to the autarky case.

Note also that

$$\frac{\alpha_L}{\beta}\frac{L_C^i(p(\sigma^i,P_L))}{p(\sigma^i,P_L)}-(1-\alpha_L)X_L^i(p(\sigma^i,P_L))$$

is decreasing in P_L, hence the equilibrium P_L with free trade will be intermediate between the corresponding autarkic values:

$$P_L^{S,A}<P_L^F<P_L^{N,A}.$$

Using (11), it follows that trade causes p (and therefore k, whenever the intermediary sector is operating) to rise in S, and fall in N. Hence output of L expands in S, contracts in N, because S exports the L good to N. Conversely the C sector will expand in N (as L_C increases owing to the fall in p), shrink in S, as it will be imported by the latter.

Movement of unskilled workers into the L sector in S owing to the expansion in exports will shrink supply of unskilled workers to the C sector, which will induce a rise in unskilled wages ($w^{S,F}>w^{S,A}$) in S, just as predicted by the Stolper-Samuelson theorem. However, full factor price equalization does

not obtain, because

$$w^{S,F} \equiv \frac{P_L^F}{p^{S,F}} \equiv \frac{P_L^F}{p(\sigma^S, P_L^F)} < \frac{P_L^F}{p(\sigma^N, P_L^F)} \equiv w^{N,F}.$$

Neither are supply prices for the L good equalized across countries. Recall that $\frac{\tilde{P}_L}{P_L} \equiv \frac{\tilde{p}}{p}$ the proportion of the consumer price that is 'passed-through' to suppliers in the L sector, is decreasing in p whenever the intermediary sector is operating. In autarky p was equalized across N and S; with trade it increased in S and fell in N. Therefore *middleman margins rise in S and fall in N as a result of trade.* Earnings inequality within the L-sector increases in country S as a result of trade, contrary to the effect on inequality within the C-sector. As explained in the previous section, the extent to which this happens depends partly on the thickness of the ability distribution around the equilibrium threshold. Without a thick middle class of entrepreneurs that enter intermediation in the L-sector as a result of increased export demand, export prices rise and these are not passed on to suppliers. In this case trade liberalization does not stimulate growth and causes inequality within the L-sector to rise sharply.

Note also that the overall effects of trade openness on inequality will depend on the relative size of the L-sector and the C-sectors. And developing countries tend to have a comparative advantage in the L-sector good. The larger the L-sector is relative to the C-sector, the greater the likelihood that trade openness will increase overall inequality. A shortage of skilled labor in the C-sector makes this more likely.

Summarizing the above discussion:

Proposition 4 *There is a unique competitive equilibrium with free trade. Country S exports the L good and imports the C good. Effects of trade in country S are the following (with opposite effects in country N): p, w, $\tilde{P}_L$, ϕ, X_L increase, L_C, X_C decreases. Middleman margins rise in S and fall in N; the margin is higher in country S. Free trade does not lead to full equalization of unskilled wages or supplier prices across countries: they are both lower in S. A larger fraction of agents in S operate intermediary firms (a^* is lower).*

Another interesting implication of higher middleman margins in S as a result of free trade is that suppliers are paid less in S (since trade equalizes the consumer price of L across countries). Hence middlemen in country N have an incentive to outsource to suppliers in S. We shall consider the implications of outsourcing in the next section.

4.2 Welfare Effects of Trade

We now study the welfare effects of trade. Aggregate real income in a country equals per capita income, deflated by the cost of living index: $Y(p, P_L)/P_L^{\alpha_L}$. Trade affects welfare through changes in both P_L and p. The conventional gains from trade concern the effect of a change in P_L, which has an effect proportional to net exports of L good:

$$\partial W(p, P_L)/\partial P_L = \frac{1}{P_L^{\alpha_L}}[X_L(p) - \alpha_L Y(p, P_L)/P_L].$$

The effect of a change in p is the novel feature of this model, representing the 'good job' effect, operating through the change in the composition of L sector

$$\partial W(p, P_L)/\partial p = \frac{1}{P_L^{\alpha_L}}[P_L X_L^{'}(p) + X_C^{'}(p)].$$

Now

$$X_C(p) = [(1-\sigma)(1-k(p))G(\underline{a})]^{\beta}\sigma^{1-\beta}$$

and

$$X_L(p) = (1-\sigma)[G(a^*(k(p),p)) - G(\underline{a}) + \int_{a^*(k(p),p)}^{\bar{a}} adG(a)]$$

Let $\frac{da^*}{dp}$ denote $\frac{\partial a^*}{\partial k}k^{'}(p)+\frac{\partial a^*}{\partial p}$. Note from the definition of $k(p) = \frac{\int_{a^*(k(p),p)}^{\bar{a}} adG(a)}{G(\underline{a})}$ that

$$k^{'}(p) = -a^*\frac{g(a^*)}{G(\underline{a})}\frac{da^*}{dp}$$

Hence

$$P_L X_L^{'}(p) + X_C^{'}(p) = P_L(1-\sigma)(a^*-1)g(a^*)[-\frac{da^*}{dp}] - \frac{P_L}{p}k^{'}(p)G(\underline{a})(1-\sigma)$$

Using the expression above for $k^{'}(p)$, this reduces to

$$(1-\sigma)\frac{P_L}{p}g(a^*)[-\frac{da^*}{dp}][(a^*-1)p - a^*]$$

which equals

$$(1-\sigma)wg(a^*)[-\frac{da^*}{dp}][(a^*-1)p - a^*].$$

Note that $\frac{dG}{dp} \equiv g(a^*)[-\frac{da^*}{dp}]$ is the effect of additional entry into the intermediary sector on output produced by this sector. The term $[(a^* -$

$1)p - a^*]$ measures the effect on aggregate income (relative to the wage rate):

$$(a^* - 1)p - a^* = (p - \tilde{p})a^* - p + (\tilde{p} - 1)a^*$$

the sum of: (i) incremental profits $[(p - \tilde{p})a^*] - p$ earned by the marginal entrepreneur with ability a^* switching from family to intermediary business, and (ii) additional rents $(\tilde{p} - 1)a^*$ generated for suppliers as a result. This income effect must be positive, because the former component is non-negative: the marginal entrepreneur cannot be worse off from switching. And the latter component is strictly positive, owing to supplier incentive rents. If the participation constraint vis-a-vis family business form was binding, the first component must be zero. If instead the incentive constraint was binding $(a^* = a_R)$, it is also positive. In either case, entrepreneurs ignore the positive externality upon supplier rents created by their decision to enter the intermediary sector. This is the key externality associated with creation of 'good jobs', appearing also in earlier work on efficiency wages (Shapiro-Stiglitz [1984], Bulow-Summers [1986]). Competitive equilibria typically involve too few good jobs. This externality causes additional welfare effects from trade, which are positive for S and negative for N.

Summarizing:

Proposition 5 *Consider the effects of trade liberalization on aggregate welfare in country $i = N, S$, measured by per capita income deflated by consumer price index: $W(p, P_L) = \frac{Y(p,P_L)}{P_L^{\alpha_L}}$. In addition to conventional gains from trade, there is an added welfare effect which is positive (resp. negative)*

if the intermediary sector grows (resp. shrinks), arising from the pecuniary externality of the intermediary sector on rents of suppliers (the 'good job' effect). Owing to trade liberalization, this added welfare effect is positive for S and negative for N. Starting from autarky, the effects of small expansion of trade is negative for N, and positive for S.

The last result follows from the fact that starting with autarky, conventional gains from small amount of trade are second-order. Hence the marginal welfare effect of trade equals the marginal 'good job' effect, positive in S and negative in N.

5 Outsourcing

With free trade in goods alone, supplier prices are lower in S, creating incentives for intermediaries in N to outsource to suppliers in S. Alternatively, if agents with a below $\underline{a}$ are workers, and intermediaries are capitalists that hire them, capitalists in N have an incentive to shift their factories to S to hire workers there, the phenomenon of direct foreign investment.

We now describe the effect of full integration of the market for supply contracts in the L sector, assuming free trade throughout. We shall refer to free-trade-cum-outsourcing as *globalization*, and use superscript G to denote this, whereas outcomes with free trade alone will be denoted by the superscript F. We shall continue to assume that workers are not free to move across countries.

The equilibrium conditions with outsourcing have to be modified as follows. Let $\gamma^i, i = N, S$ denote the fraction of country i intermediaries that source suppliers in country i, while the remaining proportion $1 - \gamma^i$ source suppliers in the other country. These correspond to mixed strategies employed by intermediaries, and we assume the law of large numbers operates.

Then the 'tightness' of the market for supply contracts in country i is given by

$$k^i = \frac{(1-\gamma^j)\int_{a_j^*}^{\bar{a}} adG(a)(1-\sigma^j) + \gamma^i \int_{a_i^*}^{\bar{a}} adG(a)(1-\sigma^i)}{(1-\sigma^i)G(\underline{a})}.$$

The probability ϕ^i of an unemployed worker getting a supply contract, the supply price $\tilde{p}^i$ continue to be described by the same functions of the tightness of the respective contract markets. Moreover, unskilled wages are determined as before:

$$w^i = \beta[\frac{\sigma^i}{L_C^i(p^i)}]^{1-\beta}.$$

With unrestricted outsourcing, supply prices must get equalized across countries, provided the market is active in both countries. Otherwise the market could close down entirely in one country and be characterized by a higher supply price than the other. If the market closes down in some country, it must be in country N. The precise conditions for this to happen can be derived from the underlying parameters of the model (e.g., if the endowment of unskilled labor relative to skilled labor between N and S is sufficiently large). In what follows we ignore this corner case, and focus on the case where the market is active in both countries. It can be checked that

all our results derived below will carry over to the corner case as well.

Lemma 1 *An equilibrium with outsourcing must involve* $w^S < w^N$ *and* $\phi^S > \phi^N$.

Proof. Suppose otherwise: $w^S \geq w^N$. Since

$$\tilde{P}_L^i = w^i[z + \frac{1-z}{\delta(1-h)(1-\phi^i)}]$$

equalization of supply prices across countries implies that $\phi^S \leq \phi^N$. This implies $k^S \leq k^N$, and therefore

$$L_C^S(p^S) \equiv (1-\sigma^S)(1-k^S)G(\underline{a}) > (1-\sigma^N)(1-k^N)G(\underline{a}) \equiv L_C^N(p^N)$$

which in turn implies that

$$w^S \equiv [\frac{\sigma^S}{L_C^S(p^S)}]^{1-\beta} < [\frac{\sigma^N}{L_C^N(p^N)}]^{1-\beta} \equiv w^N$$

a contradiction. ∎

Hence outsourcing must still lead to a lower unskilled wage in country S. Equalization of supply prices still does not ensure full factor price equalization. For if they were perfectly equalized, the 'unemployment' rates for supply contracts must be the same in both countries. Then the division of agents with a below $\underline{a}$ between the C-sector and the L-sector would be the same. With the larger endowment of skilled workers in country N, this implies a higher proportion of skilled workers to unskilled workers in the C-sector in country N: unskilled wages would then be higher in N.

The equilibrium with outsourcing differs from that under free trade alone in two specific ways, described in parts (b) and (c) of the following result.

Proposition 6 *With free trade and outsourcing of supply contracts:*

(a) factor prices are still not equalized: $w^S < w^N$*, while a larger fraction of potential suppliers obtain supply contracts in S:* $k^S > k^N$*;*

(b) middleman margins are equalized across S and N; and

(c) the threshold for intermediary firms is not lower in S: $(a^*)^N \leq (a^*)^S$

Part (b) follows from the fact that outsourcing equalizes the supply price of the L-good, while free trade equalizes the consumer price: therefore middleman margins must be equalized. Whereas with free trade alone, margins were higher in country S. This suggests that outsourcing results in a fall in the middleman margin in S and a corresponding rise in N, an issue discussed further below.

The intuition underlying result (c) is the following. Since wages are lower in S, equalization of supply prices with outsourcing implies that incentive rents for suppliers must be higher in S. This implies a lower unemployment rate in S; the present value utility of being unemployed is higher in S. This weakens the incentive role of loss of reputation, and the incentive constraint is harder to satisfy for intermediaries in S. Therefore the ability threshold for firms to enter intermediation is higher in the S country. This is also in contrast to the case of free trade alone, where country S was characterized by

a higher fraction of firms in the L-sector that were intermediaries. It suggests that outsourcing causes the intermediary sector to shrink in S and expand in N.

We turn finally to the question of effects of outsourcing, by comparing the outsourcing-cum-free-trade outcome with the free-trade-alone outcome. As the preceding discussion suggests, one would expect outsourcing to decrease the unemployment rate in S and raise it in N, as intermediaries in N outsource to S suppliers. This should raise the supply price and unskilled wages in S and lower them in N. Therefore inequality should fall in S and rise in N — the opposite of effects of trade. Moreover, the fraction of L-sector firms that intermediary should increase in N, and fall in S.

However, it is difficult to obtain these results in general, owing to the possibility of changes in terms of trade (i.e, in P_L) as a result of outsourcing. So we confine attention to the case of outsourcing between two small countries which trade with the rest of the world at a fixed price P_L^W. In this case, we can confirm that the intuition is correct:

Proposition 7 *Suppose countries S and N are small relative to the world market, and trade freely in both goods so P_L is fixed. Then outsourcing between N and S will cause k^S, w^S, ϕ^S, $\tilde{P}_L^S$ to increase, and $k^N, w^N, \phi^N, \tilde{P}_L^N$ to decrease: i.e., middleman margins, intermediation and inequality within the L-sector will rise in country N and fall in country S.*

6 Conclusion

We have developed a model of middlemen margins where presence of incentive rents imply lack of factor price equalization under free trade and/or outsourcing. The effects of trade and outsourcing on inequality and middlemen margins tend to be dissimilar: in LDCs trade raises inequality by raising middleman margins, while outsourcing reduces them, as long as there aren't large terms of trade effects of outsourcing. Conversely, in developed countries trade openness reduces middleman margins, while outsourcing raises them. This runs contrary to assertions by some economists that there are no essential differences between effects of outsourcing and trade liberalization. [7]

The model helps provide possible reasons for low 'trickle-down' of benefits of globalization in developing countries: the presence of incentive rents at different layers of the delivery chain. The benefits of increased export demand benefit middlemen the most, suppliers and unskilled workers the least. Outsourcing benefits suppliers in poor countries at the expense of intermediaries in those countries, with some trickle down to unskilled workers in the form of higher wages. Outsourcing equalizes supplier returns across North and South countries, but not unskilled wages. It reduces supplier returns, unskilled wages and 'good jobs' in developed countries, while raising profits of intermediaries that become multinational enterprises offshoring their jobs and supply contracts to poor countries. This tends to reduce poverty in

developing countries, and raise it in developed countries. [8]

There are some similarities between trade expansion and outsourcing. Both cause unskilled wages in LDCs to rise and unemployment rates to fall. The extent to which this occurs depends on the rate of entry into intermediation in LDCs (in the case of trade expansion), and in DCs (in the case of outsourcing). These in turn depend on underlying distribution of endowments of entrepreneurial 'abilities' in the respective countries.

Our model implies that an LDC where growth and employment effects of trade liberalization are sluggish owing to a slow rate of entry into intermediation, could obtain a large boost if it opens doors to direct foreign investment and outsourcing to its suppliers by multinationals from developed countries. Conversely countries with fast entry into intermediation obtain a larger growth effect from trade liberalization, and in such countries suppliers obtain a larger share of the gains from trade. The higher supply prices in such countries implies that the incentive of developed country multinationals to outsource or move their operations to those countries are smaller. Across developing countries, one could therefore witness a negative association between the extent of growth benefits from trade liberalization and from direct foreign investment. In countries with a polarized distribution of entrepreneurial abilities (such as Latin America), our model predicts that trade will not help the poor much, but outsourcing may. Conversely, the role of direct foreign investment will be smaller in East Asia where growth effects of trade openness are greater.

Unskilled agents in developed countries are hurt by both trade and outsourcing. Intermediary firms are hurt by trade, but benefit from outsourcing. We have shown that the aggregate welfare (and inequality) effects of trade may be negative for developed countries. This may justify their reluctance to lower trade barriers for farm products from developing countries. However, we are yet to obtain any results concerning the aggregate welfare effects of outsourcing. In future work, we hope to explore this issue in more detail. Meanwhile, it would be interesting to contrast the predictions of this model with empirical evidence concerning the effects of outsourcing and trade openness. The model generates numerous testable restrictions concerning effects on middlemen margins and firm composition, and how they vary with country characteristics.

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APPENDIX: Proofs

Proof of Proposition 1 We start by noting the following results which are useful for later analysis:

- If $a_R(p,k) < \bar{a}$, it is decreasing in p and increasing in k.
- $\tilde{p}(k)$, $(1-\delta)v_u(k)$ and $(1-\delta)v_h(k)$ are strictly increasing and strictly convex in k.
- $\tilde{p}(k) > (1-\delta)v_h(k) > (1-\delta)v_u(k)$ and $(1-\delta)v_u(0) = 1$.
- Define
$$a^* = a^*(k,p) = \max\{\underline{a}, \frac{p}{p-\tilde{p}(k)}, a_R(p,k)\}$$
If $a^* \in (\underline{a}, \bar{a})$, it is decreasing in p and increasing in k.
- Define
$$a^{**} = a^{**}(k,p) = \max\{\underline{a}, a_R(p,k)\}$$
If $a^{**} \in (\underline{a}, \bar{a})$, it is decreasing in p and increasing in k.

It is easy to show that

$$p_F(0) = 1 + (1-\delta)(1-z)/\delta < \frac{(1-\delta)(\tilde{p}(0)-z)}{\delta} + \tilde{p}(0) + 1/\bar{a} = p_R(0).$$

Define $k_F(p)$ as k which satisfies

$$k = \frac{\int_{a^*(k,p)}^{\bar{a}} a dG(a)}{G(\underline{a})}.$$

Define $k_R(p)$ as k which satisfies

$$k = \frac{\int_{a^{**}(k,p)}^{\bar{a}} a dG(a)}{G(a^{**}(k,p))}.$$

Such $k_F(p)$ and $k_R(p)$ are well-defined, since the right hand sides of the above equations map $[0,1]$ continuously into $[0,\infty)$; $a^*(k,p)$ and $a^{**}(k,p)$ are continuous and non-decreasing in k and converges to $\bar{a}$ as k goes to one.

Some additional results which will be useful shortly:

(i) $k_F(p)$ is increasing in the region of p where $a^*(k_F(p),p) \in (\underline{a},\bar{a})$. $k_R(p)$ is increasing in the region of p where $a^{**}(k_R(p),p) \in (\underline{a},\bar{a})$.

(ii) $a^*(k_F(p),p)$ and $a^{**}(k_R(p),p)$ are decreasing in p in the region where $a^*(k_F(p),p) \in (\underline{a},\bar{a})$ and $a^{**}(k_R(p),p) \in (\underline{a},\bar{a})$.

(iii) $p - \tilde{p}(k_F(p))$ and $p - \tilde{p}(k_R(p))$ are increasing in p.

To show (iii), note that whenever $a_R(k_F(p),p) = a^*(k_F(p),p)$

$$p - \tilde{p}(k_F(p)) = (1-\delta)[v_u(k_F(p))/a_R(k_F(p),p) + \tilde{p}(k_F(p)) - z)/\delta].$$

Since $v_u(k_F(p))$ and $\tilde{p}(k_F(p))$ are increasing in p, and $a_R(k_F(p),p)$ is decreasing in p, the right hand side is increasing in p.

Consider alternately p where $a^*(k_F(p),p) = \frac{p}{p-\tilde{p}(k_F(p))}$,

$$p - \tilde{p}(k_F(p)) = p/a^*(k_F(p),p).$$

The left hand side is increasing in p, since $a^*(k_F(p),p)$ is decreasing in p. For p such that $a^*(k_F(p),p) = \bar{a}$, clearly $p - \tilde{p}(k_F(p)) = p - \tilde{p}(0)$ is increasing in p. A similar argument establishes that $p - \tilde{p}(k_R(p))$ is increasing in p.

We now consider different regions for p:

(1) $p < p_F(0)$

In this case, $[p - (1-\delta)v_u(0)] < (1-\delta)(1-z)/\delta$ and

$$p - \tilde{p}(0) - (1-\delta)v_u(0)/\bar{a} \leq (1-\delta)(\tilde{p}(0) - z)/\delta,$$

and the incentive constraints for family business and intermediary are not satisfied. Then there cannot be any supply of good L, and we have $X_L(p) = 0$, $L_C(p) = 1 - \sigma$.

(2) $p_F(0) \leq p \leq \max\{p_R(0), \tilde{p}(0)\bar{a}/(\bar{a}-1)\}$

In this case the incentive constraint for family business is satisfied: $[p - (1-\delta)v_u(0)] \geq (1-\delta)(1-z)/\delta$ while either the incentive or participation constraint for intermediary business are not satisfied: Either

$$p - \tilde{p}(0) - (1-\delta)v_u(0)/\bar{a} \leq (1-\delta)(\tilde{p}(0) - z)/\delta,$$

or

$$p \leq \tilde{p}(0)\bar{a}/(\bar{a}-1)$$

or both hold. Then only family business can operate in the L sector. In this case: If $a < \underline{a}$, the agent becomes a worker in the C-sector, while if $a \geq \underline{a}$, the agent operates a family business in the L sector. We have $X_L(p) = (1-\sigma)(1 - G(\underline{a}))$ and $L_C(p) = (1-\sigma)G(\underline{a})$.

(3) $p > \max\{p_R(0), \tilde{p}(0)\bar{a}/(\bar{a}-1)\}$

We show that in this region, intermediary businesses must operate. Suppose not. Then $k = 0$. But since

$$(p - \tilde{p}(0) - (1 - \delta)v_u(0)/\bar{a}) > (1 - \delta)(\tilde{p}(0) - z)/\delta,$$

and

$$(p - \tilde{p}(0))\bar{a} > p,$$

the incentive constraint and the participation constraint for retailing are satisfied for agents with a close enough to $\bar{a}$.

In this price region, the incentive constraint for a family business is also satisfied. Suppose not. Then any agent with $a < a^{**}$ becomes a potential supplier (i.e., someone who seeks a supply contract), and agents with $a \geq a^{**}$ become intermediaries. Then the equilibrium k is $k_R(p)$. As shown above, $p - \tilde{p}(k_R(p))$ is increasing in p, implying that $p - (1 - \delta)v_u(k_R(p))$ is also so. $p > p_R(0) > p_F(0)$ implies

$$p - p_F(k_R(p)) > p_R(0) - p_F(k_R(p_R(0))) = p_R(0) - p_F(0) > 0$$

This means that the incentive constraint for a family business is satisfied in this price region. Therefore any agent with $a \in [\underline{a}, a^*(k_F(p), p))$ will operate a family business.

In this region, therefore, occupational choices are as follows: (i) If $a < \underline{a}$, the agent becomes a potential supplier; (ii) if $a \in [\underline{a}, a^*(k_F(p), p))$, the agent becomes a family business; (iii) if $a > a^*(k_F(p), p)$, the agent becomes a

intermediary. The supply of good L is

$$X_L(p) = (1-\sigma)[G(a^*(k_F(p),p)) - G(\underline{a}) + \int_{a^*(k_F(p),p)}^{\bar{a}} adG(a)]$$

while the supply of unskilled labor in the C-sector is

$$L_C(p) = (1-\sigma)(1-k_F(p))G(\underline{a}).$$

This completes the proof of Proposition 1.

Proof of Proposition 2 Note that for p such that $p > \max\{p_R(0), \tilde{p}(0)\bar{a}/(\bar{a}-1)\}$, the following properties hold:

(i) $(1-\delta)v_u(k_F(p))$ and $(1-\delta)v_h(k_F(p))$ are increasing in p

(ii) $p-\tilde{p}(k_F(p))$, $p-(1-\delta)v_u(k_F(p))$ and $p-(1-\delta)v_h(k_F(p))$ are positive and increasing in p

(iii) Consider the change from p to $p^{'}$ so that $p^{'} > p$. Then $(p-\tilde{p}(k_F(p))a^*(k_F(p),p) - p < (p^{'} - \tilde{p}(k_F(p^{'}))a^*(k_F(p),p) - p^{'}$

Properties (i) and (ii) have already been established in the proof of Proposition 1. For (iii), first consider the case $a^*(k_F(p),p) = \frac{p}{p-\tilde{p}(k_F(p))}$. Since $a^*(k_F(p),p) = \frac{p}{p-\tilde{p}(k_F(p))} > a^*(k_F(p^{'}),p^{'}) \geq \frac{p^{'}}{p^{'}-\tilde{p}(k_F(p^{'}))}$,

$$(p-\tilde{p}(k_F(p)))a^*(k_F(p),p) - p = 0 < (p^{'} - \tilde{p}(k_F(p^{'}))a^*(k_F(p),p) - p^{'}$$

Next suppose that $a^*(k_F(p),p) = a_R(k_F(p),p)$. Then from the definition of $a^* \equiv a^*(k_F(p),p)$,

$$(p-\tilde{p}(k_F(p)))a^* = (1-\delta)[v_u(k_F(p)) + (\tilde{p}(k_F(p)) - z)a^*/\delta].$$

Using

$$(1-\delta)v_u(k) = \tilde{p} - c$$

where $c = \frac{1-\delta(1-h)}{\delta(1-h)}(1-z)$, and $\tilde{p} = \tilde{p}(k_F(p))$, the above equality reduces to

$$(1-\tilde{p}/p)a^* = \tilde{p}/p - c/p + (1-\delta)(\tilde{p}/p - z/p)a^*/\delta$$

or equivalently

$$\tilde{p}/p = \frac{a^* + c/p + (1-\delta)/\delta(za^*/p)}{a^* + 1 + (1-\delta)a^*/\delta}.$$

On the other hand, since $a^* > a^*(k_F(p'), p') \geq a_R(k_F(p'), p')$, with $\tilde{p}' \equiv \tilde{p}(k_F(p'))$,

$$(p' - \tilde{p}')a^* > \tilde{p}' - c + (1-\delta)(\tilde{p}' - z)a^*/\delta.$$

This is equivalent to

$$\tilde{p}'/p' < \frac{a^* + c/p' + (1-\delta)/\delta(za^*/p')}{a^* + 1 + (1-\delta)a^*/\delta}.$$

Therefore $p < p'$ implies $\tilde{p}'/p' < \tilde{p}/p$. This establishes property (i) of Proposition 2. And property (iii) follows from:

$$0 < (p-\tilde{p})a^* - p = p[(1-\tilde{p}/p)a^* - 1] < p'[(1-\tilde{p}'/p')a^* - 1] = (p' - \tilde{p}')a^* - p'.$$

This completes the proof of Proposition 2.

Proof of Proposition 6. Result (a) has been established in Lemma 1. Result (b) follows from the fact that with free trade-cum-outsourcing, both the supply price and the consumer price of the L-good must be the same across countries. So we need to establish (c).

Consider first the case where $a^* = a_R$ in both countries, where the incentive constraint for intermediaries just binds. In that case we need to show that $a_R^S \geq a_R^N$. This latter property implies the result more generally: if $a^{*S} > a_R^S$ then $a^{*S} = \frac{P_L}{P_L - \tilde{P}_L}$ in which case a^{*N} must also equal this value. Otherwise $a^{*N} = a_R^N > \frac{P_L}{P_L - \tilde{P}_L}$ and therefore $a_R^S < a^{*S} = \frac{P_L}{P_L - \tilde{P}_L} < a_R^N$.

The incentive constraint now takes the form:

$$P_L - \tilde{P}_L - (1-\delta)\frac{V_u^i}{a_R^i} = \frac{1-\delta}{\delta}[\tilde{P}_L - zw^S] \tag{13}$$

where there is no country superscript on P_L or $\tilde{P}_L$ since both are equalized under globalization, and the deviation payoffs use the unskilled wage in country S because that is the cheapest way for suppliers in either country to procure a unit of the low quality good. Dividing through by P_L we obtain

$$1 - \frac{\tilde{P}_L}{P_L} - (1-\delta)\frac{V_u^i}{P_L a_R^i} = \frac{1-\delta}{\delta}[\frac{\tilde{P}_L}{P_L} - z\frac{1}{p^S}]. \tag{14}$$

Moreover the supply price in both countries is set at the point where suppliers' incentive constraint is binding:

$$\frac{\tilde{P}_L}{P_L} = (1-\delta)\frac{V_u^i}{P_L} + \frac{[1-\delta(1-h)](1-z)}{\delta(1-h)}\frac{w^i}{P_L} \tag{15}$$

Thus $w^S < w^N$ implies that $\frac{V_u^S}{P_L} > \frac{V_u^N}{P_L}$. From (14) it now follows that $a_R^S \geq a_R^N$. This completes the proof of Proposition 6.

Proof of Proposition 7 Notice that equation (13) for the country i threshold type a_R^i where the incentive constraint for intermediation is satisfied, can be written as

$$P_L^W - \tilde{P}_L^i(k^i) - (1-\delta)\frac{V_u^i(k^i)}{a_R^i} = \frac{1-\delta}{\delta}[\tilde{P}_L^i(k^i) - zw^S(k^S)] \tag{13}$$

where

$$w^i(k^i) = \beta[\frac{\sigma^i}{(1-\sigma^i)(1-k^i)G(\underline{a})}]^{1-\beta}$$

$$(1-\delta)V_u^i(k^i) = w^i(k^i)[1+(1-z)\frac{\phi(k^i)}{\delta(1-h)(1-\phi(k^i))}]$$

and

$$\tilde{P}_L^i(k^i) = (1-\delta)V_u^i + w^i(k^i)\frac{\{1-\delta(1-h)\}(1-z)}{\delta(1-h)}.$$

Suppressing P_L^W in the notation, $a_R^S = a_R^S(k^S)$ is increasing, while $a_R^N = a_R^N(k^N, k^S)$ is increasing in k^N and decreasing in k^S. Therefore $a^{*S}(k^S) = \max\{\underline{a}, \frac{P_L^W}{P_L^W - \tilde{P}_L^S(k^S)}, a_R^S(k^S)\}$ and $a^{*N}(k^N, k^S) = \max\{\underline{a}, \frac{P_L^W}{P_L^W - \tilde{P}_L^N(k^N)}, a_R^N(k^N, k^S)\}$. It is easily checked that a^{*S} is increasing in k^S.

Outsourcing causes k^S to rise. Otherwise, if k^S decreases or remains the same, we have a^{*S} falling or remaining the same, so $\int_{a^{*S}}^{\bar{a}} adG(a)$ cannot go down. Therefore

$$k^S(1-\sigma^S)G(\underline{a}) - \int_{a^{*S}}^{\bar{a}} adG(a) \leq 0 \tag{16}$$

as this expression equaled 0 in the absence of outsourcing.

On the other hand, equilibrium in the market for supply contracts with outsourcing implies that

$$k^S(1-\sigma^S)G(\underline{a})+k^N(1-\sigma^N)G(\underline{a}) = (1-\sigma^S)\int_{a^{*S}}^{\bar{a}} adG(a)+(1-\sigma^N)\int_{a^{*N}}^{\bar{a}} adG(a). \tag{17}$$

We have shown above (Proposition 6) that $w^S < w^N$, $k^S > k^N$ and $a^{*S} \geq a^{*N}$. Therefore $k^S G(\underline{a}) > k^N G(\underline{a})$ while $\int_{a^{*S}}^{\bar{a}} adG(a) \leq \int_{a^{*N}}^{\bar{a}} adG(a)$. This implies

that

$$(1-\sigma^S)[k^S G(\underline{a}) - \int_{a^{*S}}^{\bar{a}} adG(a)] > 0 > (1-\sigma^N)[k^N G(\underline{a}) - \int_{a^{*N}}^{\bar{a}} adG(a)]$$

which contradicts (16).

Outsourcing also causes k^N to decrease. Let $a_R^N(k^N)$ be a_R^N which satisfies

$$P_L^W - \tilde{P}_L^N(k^N) - (1-\delta)\frac{V_u^N(k^N)}{a_R^N} = \frac{1-\delta}{\delta}[\tilde{P}_L^N(k^N) - zw^N(k^N)]$$

Since $w^S(k^S) < w^N(k^N)$ in an equilibrium with outsourcing, $a_R^N(k^N, k^S) > a_R^N(k^N)$. With $a^{*N}(k^N) = \max\{\underline{a}, \frac{P_L^W}{P_L^W - \tilde{P}_L^N(k^N)}, a_R^N(k^N)\}$, $a^{*N}(k^N, k^S) \geq a^{*N}(k^N)$. Now suppose that outsourcing does not decrease k^N. Since $k^N G(\underline{a}) - \int_{a^{*N}(k^N)}^{\bar{a}} adG(a)$ is increasing in k^N and zero in an equilibrium of free trade,

$$0 \leq k^N G(\underline{a}) - \int_{a^{*N}(k^N)}^{\bar{a}} adG(a) \leq k^N G(\underline{a}) - \int_{a^{*N}(k^N, k^S)}^{\bar{a}} adG(a)$$

in an equilibrium with outsourcing. This contradicts $k^N G(\underline{a}) - \int_{a^{*N}(k^N, k^S)}^{\bar{a}} adG(a) < 0$. This completes the proof of Proposition 7.

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tries: The Latin American Challenge to East Asian Conventional Wisdom," *World Bank Research Observer*, 11:1, 33-57.

NOTES

1. Mookherjee's research was supported by NSF Grant No. SES-0617874.

2. Morisset [1998] reports that the price of coffee declined 18% on world markets but increased 240% for consumers in the US between 1975–93. The average margin between US consumer price and world price for beef, coffee, oil, rice, sugar and wheat increased by 83% between 1975–94.

3. There are three groups of unskilled agents in our economy: entrepreneurs in the L-sector, workers or suppliers in the L-sector and workers in the C-sector. Inequality between entrepreneurs and suppliers in the L-sector falls as a result of outsourcing, but rises between the latter and workers in the C-sector.

4. The incentive constraint for supplier is

$$\frac{\tilde{P}_L + \delta h V_u}{1 - \delta(1-h)} \geq \tilde{P}_L + (1-z)w + \delta V_u$$

with the supply contract where $\tilde{P}_L$ is paid for each period as long as it is not terminated.

5. More generally, the skills could be imparted to agents at all values of a. One would expect, however, that the impact on poorer agents would be greater, in the presence of credit constraints that inhibit educational investments in private schooling.

6. Note that the supply function of the L-sector is discontinuous at $p = p_F(0)$. At p slightly below $p_F(0)$, supply is zero, while it is $(1-\sigma)(1-G(\underline{a}))$ at p at or slightly above $p_F(0)$. If (8) is violated, we cannot have a competitive equilibrium with p above $p_F(0)$, as there is excess supply of the L good. And we cannot have an equilibrium at p below $p_F(0)$ as that will involve excess demand for the L good. So equilibrium must entail $p = p_F(0)$ and rationing of supply.

7. For instance, in a well known blog, Greg Mankiw writes:

   > "..Few propositions command as much consensus among professional economists as that open world trade increases economic growth and raises living standards....The same principles apply to offshore outsourcing of services as to traditional trade in goods."
   > (Greg Mankiw, http://gregmankiw.blogspot.com/2006/05/outsourcing-redux.html)

8. See Feenstra [1998] for a discussion of the role of outsourcing in OECD countries in reducing the employment of unskilled workers. He argues that the role of outsourcing and skill-biased technical change are complementary and that it is often difficult to separate the two. Nevertheless there are some empirical estimates of the relative significance of the two in explaining patterns of increasing wage dispersion in the US between 1972-90, which assign a non-negligible fraction (20%) to

outsourcing.

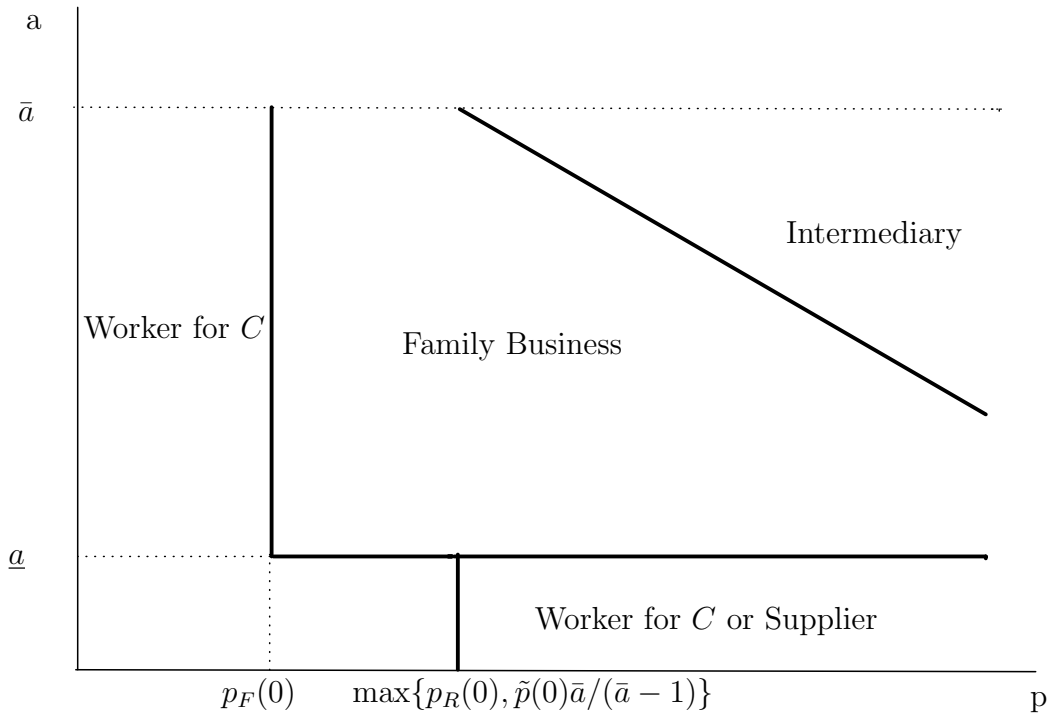

Figure 1: L-Sector Equilibrium Occupational Choices

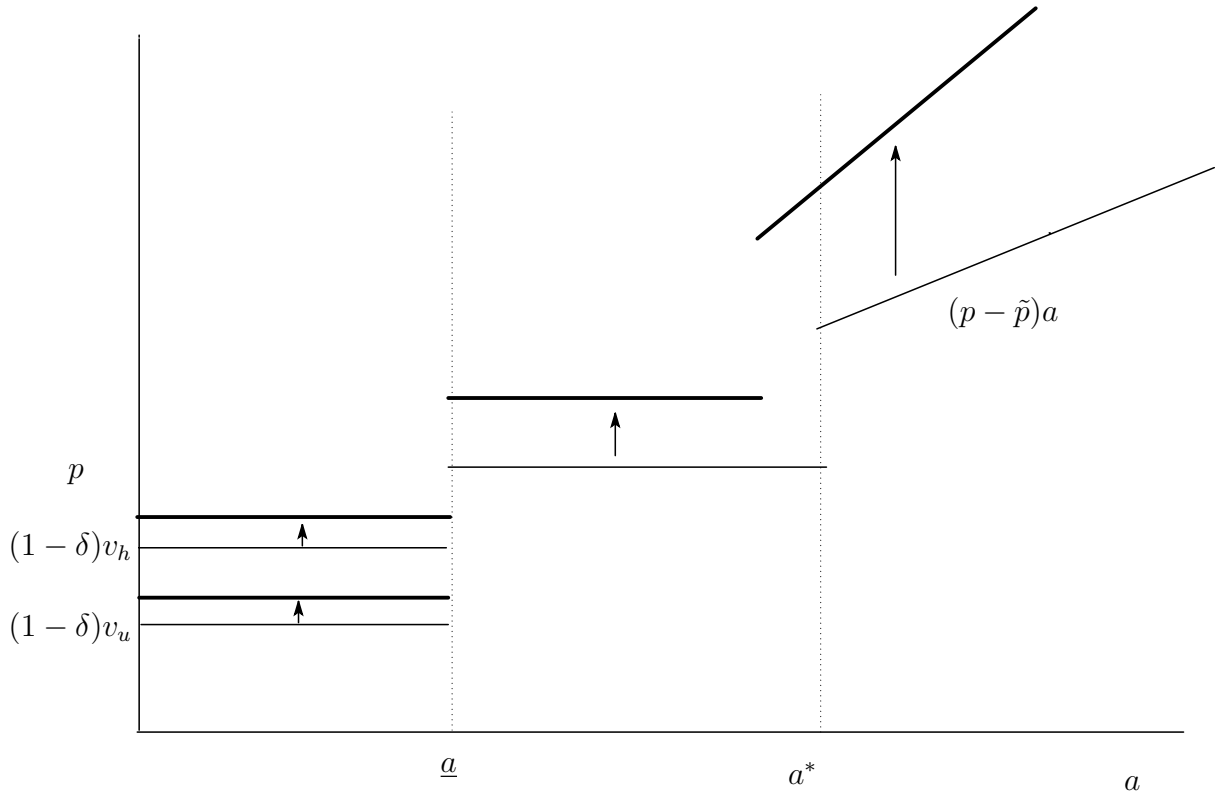

Figure 2: Comparative Statics of L-Sector Earning Patterns as p Increases