Protection, Skill Formation and Income Distribution

Sugata Marjit[a*]

City University of Hong Kong

Abstract

This short paper looks at the process of skill-formation and income inequality for a small developing economy where credit market for financing education or human capital formation is absent. This assumption is more or less consistent with the literature on human capital accumulation under credit market imperfection. We show that protection discourages skill formation and may aggravate inequality. Free-trade puts a check on the problem of acute credit market imperfection by reducing the cost of skill acquisition. We provide an example where freer trade leads to better income distribution for the poor.

JEL Classification: F13, F16, I22

Keywords: credit market; skill formation, protection

1. Introduction

Debates regarding how and why international trade worsens the skilled-unskilled wage / income gap continue relentlessly. While such concern in the USA and Europe has inspired early contributions to the literature, similar issues have been raised in the context of free trade and rising inequality in the developing world. The theoretical literature is simply huge and is beyond compilation in terms of a few papers. Interested readers may consult the textbook of Robert Feenstra (2003) for the debate boiling in the USA and Europe and a good survey of the existing literature. Similar papers in the context of the developing countries are relatively few. For a comprehensive overview up to 2001, one may refer to Marjit and Acharya (2003). More recent contributions to this area of research

---

[*] Contact address: Department of Economics and Finance, City University of Hong Kong, Tat Chee Avenue, Kowloon Tong, Kowloon, Hong Kong. Tel: (852) 2194-2439. Fax: (852) 2788-8842. Email: smarjit@hotmail.com.

are by Marjit, Beladi and Chakraborty (2003), Zhu and Trefler (2005), Jones and Marjit (2003), Marjit and Kar (2005) and Marjit and Acharya (2006). This short paper looks at the process of skill-formation and income inequality for a small developing poor economy where a credit market for financing education or human capital formation is absent. This assumption is more or less consistent with the literature on human capital accumulation under credit market imperfection (Galor and Zeira (1993), Banerjee and Newman (1993)). In our framework people can acquire skill only by investing owned capital; they cannot borrow or lend for financing education. However, there is a manufacturing sector, where capital can be invested or lent out to the entrepreneurs (may be through banks: the actual process is kept hidden in a black box). Therefore, individuals can either put their money in education and / or invest in the manufacturing sector. We show that protection discourages skill formation and may aggravate inequality. Hence, free-trade to some extent puts a check on the problem of acute credit market imperfection.

The second section develops the model with three income classes. The last section concludes.

2. The Model

There are three income classes in the economy each having one unit of labor and differing amounts of capital. Subscripts l, m and h stand for the low, middle and high-income classes. Per capita capital stock in each class is $k_1 < k_m < k_h$ respectively and number of people in each class is $n_1 < n_m < n_h$. There are three sectors, the first produces a primitive / traditional good X with only labor. The second produces an import-competing manufacturing good Y with capital and labor. The third produces a skilled good S with only skilled labor. $\bar{k}$ amount of capital and one unit of labor are required for acquiring skill which promises a wage w_s.

The following competitive price condition holds. The symbols have usual interpretations.

$$wa_{LX} = P_x \tag{1}$$

$$wa_{LY} + ra_{KY} = P_y \tag{2}$$

$$w_s a_s(k) = P_s \tag{3}$$

With $a_s(k) \to \infty$ for $k < \bar{k}$ and $a_s(k) = \bar{a}$ for $k \geq \bar{k}$. It is obvious that no one is going to invest more than $\bar{k}$ for acquiring skill.

It is a small open economy. So given the commodity prices one can uniquely determine w, r and w_s. w_s is nothing but $P_s/\bar{a}$. For anyone interested in acquiring skill and having endowed with k_i; $i = 1, m, h$ amount of capital, should check whether $k_i \geq \bar{k}$ and if it is, then whether:

$$w + rk_i < w_s = \frac{p_s}{\bar{a}} \tag{4}$$

LHS in (4) gives us the opportunity cost of acquiring skill. To get to the equilibrium of the system, let us suppose $\bar{k} = k_m$. This assumption is made to point out an example as to how actual equilibrium of the system can be arrived at. Also assume that:

$$w + rk_m < w_s \tag{5}$$

$$w + rk_h < w_s \tag{6}$$

(5) and (6) imply that the middle class and the rich will acquire education or skills the poor can not.

Therefore capital and labor left out for production of X and Y are given by $k_1 n_1 + (k_h - \bar{k})n_h$ and n_1 respectively. Note that the middle class put all their capital into education and both middle and the rich are engaged in education and cannot supply labor.

Therefore, now the full employment conditions are given by:

$$a_{LX}X + a_{LY}Y = n_1 \tag{7}$$

$$a_{KY}Y = k_1 n_1 + (k_h - \bar{k})n_h \tag{8}$$

(7) and (8) determine X and Y. One can check that for $X > 0$, "the cone of diversification" condition needs to be satisfied.

Suppose now, more realistically, the w_s function is specified as follows:

$$w_s = \frac{P_s}{a_s(k)} \tag{9}$$

with restriction on $a_s(k)$ so that $w_s' > 0$ and $w_s'' < 0$. We rule out the existence of $\bar{k}$.

The poor will check whether

$$w + rk_1 > w_s(k_1) \tag{10}$$

There will be a $\tilde{k}$ such that

$$w_s'(\tilde{k}) = r \tag{11}$$

$\tilde{k}$ is the optimum capital allocation for skill acquisition.

One possible configuration will be:

$$w + rk_m > w_s(k_m) \tag{12}$$

$$w + rk_h < w_s(\tilde{k}) \tag{13}$$

$$\text{with } k_1 < k_m < \tilde{k} < k_h \tag{14}$$

(10), (12) and (13) suggest that the poor and the middle will not acquire skill and the rich will. Accordingly the size of X and Y will be determined.

Suppose now that Y is initially protected by a tariff. As the tariff drops, r will fall since w is determined by P_x. As r falls, LHS in (10) and (12) will fall and it is possible that both the middle and the poor will go for skill accumulation. As w_s is increasing in k, $w_s(k_1)$ and $w_s(k_m)$ both can be quite low relative to $w_s(\tilde{k})$. However, substantial decline in r will make both groups go for educational investments. Thus freer trade encourages skill acquisition.

Relative income gap between the rich and the poor is measured by i_{hl}.

$$i_{hl} = \frac{w_s(\tilde{k}) + r(k_h - \tilde{k})}{w + rk_1} \tag{15}$$

As r goes down due to trade liberalization the rich loses more relative to the poor as $k_h > k_l$. One can find out the condition that i_{hl} will actually go down with a decline in r. A lower r will encourage skill formation and may reduce degree of inequality.

One can also check that a rise in w through an increase in P_x will reduce r. This will tend to penalize those endowed with relatively high amount of capital. Chances are that the middle class may actually lose in terms of income and is likely to switch towards skill accumulation if they are not already engaged in such activity.

Suppose P_x and P_s increase at the same rate. That is going to increase the relative return from skill-accumulation since r is going to be reduced. Anything that makes relative allocation in manufacturing industry less worthwhile will promote education.

3. Conclusion

Protection, in a typical developing country, tends to pamper the physically capital-intensive segment, raising the return to capital. Higher return in production may not allow capital to be profitably employed for skill accumulation or education. Only those owning substantial capital stock can afford to be educated. Thus protection clearly generates a divide between the educated and uneducated, although the some of the uneducated ones can earn a nice return on the little capital stock they own, which they do not waste on education. We prove that a movement towards free trade increases demand for education and skill formation and interestingly can reduce the degree of inequality as well. Hence, when credit is not available for education, freer trade may tone down the impact of credit shortage, a point raised in a completely different context by Jones and Marjit (2001).

References

Banerjee, A.V. and A. F. Newman, 1993, "Occupational Choice and the Process of Development", *Journal of Political Economy*, 101, 274–298.

Feenstra, R., 2003, *Advanced International Trade: Theory and Evidence*, Princeton University Press.

Galor, O. and J. Zeira, 1993, "Income Distribution and Macroeconomics", *Review of Economic Studies,* 60 (1) 35–52.

Jones, R.W. and S. Marjit, 2001, "The Role of International Fragmentation in the Development Process", *American Economic Review*, 91, 363–366.

Jones, R.W. and S. Marjit, 2003, "Economic Development, Trade and Wages" *German Economic Review*, 4 (1), 1–17.

Marjit, S. and R. Acharyya, 2003, *International Trade, Wage Inequality and The Developing Economy – A General Equilibrium Analysis,* Physica-Springer Verlag, New York, Heidelberg.

Marjit, S. and R. Acharyya, 2006, "Trade Liberalization, Skill-linked Intermediate and Two Sided Wage Gap" *Journal of Policy Reform*, 9(3), 203–218.

Marjit, S., H. Beladi A. and Chakraborty, 2003, "Trade and Wage Inequality in Developing Countries", *Economic Enquiry*, 42 (2): 295–303.

Marjit, S. and S. Kar, 2005, "Emigration and Wage Inequality", *Economics Letters*, 88(1), 141–145.

Zhu, S. and D. Trefler, 2005, "Trade and Inequality in Developing Countries – A General Equilibrum Analysis", *Journal of International Economics*, 21–48.