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International Outsourcing, Unemployment and Welfare: A Re-Examination*

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This paper explores the ramifications of international outsourcing on unemployment, income distribution and welfare, which is an important but yet unresolved issue. Using the well-known Harris-Todaro (1970) model of sector-specific unemployment, it shows that the effects of outsourcing on employment, income-distribution and welfare depend on the sector in which the outsourcing occurs, whereby sectoral factor intensities, unemployment-outsourcing response and the dynamic stability condition play crucial roles. In particular, outsourcing in the manufacturing (primary) sector widens (narrows) income inequality by increasing (decreasing) the sectoral wage gap and raising (not affecting) the rental income of the capital owners in the economy. Moreover, outsourcing in the manufacturing (primary) sector can be welfare-decreasing (is always welfare-increasing) due to its negative (positive) employment effect mitigating (reinforcing) the primary gains from the outsourcing.

Keywords: Outsourcing, Factor-Augmenting Effect, Unemployment, Dynamic Stability, Immiserizing Growth
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I. INTRODUCTION

Over the last several decades, amid the increasing trend of trade liberalization, international outsourcing has surfaced as a prevalent way of doing trade among nations. Known also as "offshoring" or "fragmentation, it is now usual that firms in one country outsource intermediate and/or finished goods or services from other firms in foreign countries so as to lower production costs and increase productivity. For example, client firms in developed countries in the North [i.e. the United States (US) and European Union (EU)], while maintaining management base and conducting research and development (R&D) at home, shift their manufacturing activities to developing countries in the South where labor costs are lower (e.g., China, India, Malaysia, Philippines, Thailand, and Vietnam) and/or buy a substantial amount of parts or services from local firms there.

Consequently, the rapidly increasing trend of outsourcing in world trade has inspired a spate of intellectual contributions to the literature from economists in the fields of international trade and economic development (i.e., Chao and Yu, 1993; Bhagwati, Panagariya and Srinivasan, 2004; Kohler, 2004; Long, 2005; Jones, 2005).[1] Among the rich and still growing body of literature studying various aspects of international outsourcing are two notable works evaluating outsourcing in the Neoclassical Heckscher-Ohlin (HO henceforth) general equilibrium framework: one by Bhagwati, Panagariya and Srinivasan, (2004, BPS henceforth) and the other by Batra and Beladi (2010, BB henceforth). In the former work, BPS (2004) argued that with outsourcing trade opportunity increases resulting in gain similar to that of information technology that converts the hitherto non-tradable service into a Mode 1 service. This is analytically the equivalent of growth. Further, BPS (2004) deliberated over the effects of outsourcing on the terms of trade and the welfare with reference to the conventional growth theorems based on the HO model. Later, BB (2010), inspired by Mankiw's argument for offshoring expressed in the context of the 2004 Report of the President,[2] explored several major properties of international trade (most

[1] Other recent studies on outsourcing include Feenstra (1998), Deardorff (2001), Egger and Egger (2003), Helpman, Melitz and Yeaple (2004), Grossman and Rossi-Hansberg (2008), among others.

[2] See Mankiw, Romer and Weil (2004) and Mankiw and Swagel (2006) for their extensive recount of the debate around Mankiw's 2004 statement about welfare gains from outsourcing.

importantly the welfare effect) by incorporating a factor-augmenting feature of outsourcing into the general equilibrium HO model.[3]

We note that while attention on international outsourcing has been largely placed on that from North to South, a firm's decision to outsourcing can actually be driven by a variety of factors including but not limited to lower labor costs in the South. Those factors can also include capital, technology and organizational competency; together they enhance the overall operational capability and profitability of the firm's production. To illustrate, the US and EU countries outsource products from each other. China outsources a variety of intermediate goods (such as crude petroleum, integrated circuit and iron ore) from Australia, Germany, Hong Kong, Japan, and South Korea among others, while itself shifting outsourcing goods (of garments, apparels, toys, foot wares, and tools) to other developing countries in Asia, Latin America, and Africa.

These actual patterns of outsourcing over the recent years reveal several important facts: First, outsourcing can occur universally among countries whereby it can be of any direction, namely, from North to South, from North to North, from South to North, and from South to South. Second, each time goods and services are imported, the importing country has possibly outsourced a portion of economic activity from abroad – that is, all trades are likely to involve some outsourcing of intermediate inputs. Third, for the trading countries and the world, free trade with outsourcing is always superior, or at least equivalent, to free trade without outsourcing because outsourcing denotes a state of free trade coupled with partial factor migration among nations.[4] Fourth, as in the case of free trade, although a nation as a whole gains from outsourcing, not all of its agents gain from it – that is, some agents gain while others lose. The question of outsourcing versus insourcing (protection) is still a lively subject of debates among the economists and policy makers.

The purpose of this paper is to investigate the ramifications of international outsourcing for unemployment, income distribution and welfare in a small country

[3] Worthwhile to note that (i) the BPS (2004) argument concerning the growth effect of outsourcing, albeit confined to the case of Mode 1 outsourcing, anticipates the BB's (2010) case of factor-augmenting effect of outsourcing (notably, labor-augmenting effect); (ii) the BB (2010) confines itself to the case of outsourcing occurring only in the exportable sector of a small country.

[4] BPS (2004) noted three scenarios of trade, namely autarky, free trade before outsourcing and free trade with outsourcing. They argued that either of the trade outcomes will be preferable to autarky in welfare terms. However, while free trade with outsourcing will be preferred to free trade without outsourcing in an economy with fixed terms of trade and no other distortions.

using the well-known Harris-Todaro (1970, HT, henceforth) model of sector-specific unemployment. There are several motivations behind this investigation: First, despite the presence of a prolific literature on outsourcing, studies using the general equilibrium approach are scanty and most of them assume full employment of labor. Hence there is no explicit view regarding the employment effects of outsoucing, with only three recent exceptions of the work by Keuschnigg and Ribi (2009), Yabuuchi (2011), and Zhang (2011). Keuschnigg and Ribi (2009) investigate the consequences of outsourcing of labor-intensive activities upon low-wage economies and derive the welfare optimal redistribution and unemployment insurance policies. This study is essentially confined to the typical North to South outsourcing. Yabuuchi (2011) examined the effects of outsourcing on unemployment and income distribution for an outsourcing country in the HT (1970) model of unemployment. However, Yabuuchi's work (2011), based on BB's (2010) factor-augmenting mechanism of outsourcing in the HO model, appears mis-interpreting Mankiw et al.'s (2004) argument for the gains generated by outsourcing. To be specific, while Mankiw et al. (2004) implies that gains from outsourcing are derived from the discrepancy by which the marginal revenue product of the outsourced goods and services (i.e., outsourced factors, henceforth) exceeds the price (or the marginal cost) of the outsourced factors, Yabuuchi (2011) attributes the welfare-increasing effect of outsourcing to the decreasing foreign price of the outsourced factors (without considering the marginal revenue product side of the outsourced factors) as if welfare gain cannot exist if the foreign prices of the outsourced factors are not falling. The results in Yabuuchi (2011) cannot reflect the real-world phenomenon of the dramatic growth in international outsourcing in recent decades with the precipitous increases in the international prices of outsourced factors (possibly caused by the rising resource prices and environmental costs in the South, notably in China).[5] Concomitantly, Zhang (2011) explores the impact of international outsourcing on unemployment and social welfare by incorporating both distortions of a minimum-wage constraint into the conventional trade model. The scale economies, however, are linked with the production of the most skill-intensive good whereas the minimum wage prevails in the unskilled labor market. Therefore, even though

[5] To be specific, Yabuuchi (2011) analyzed various effects of outsourcing in terms of exogenously decreasing foreign prices of outsourced factors (e.g., $dW/db < 0$) (but not in terms of the level of outsourcing [e.g., $dW/d(A\text{-}1)$ or dW/dA]. To counter the rising costs of outsourcing, many outsourcing firms of the North have adopted new strategies such as vendor-country diversification, partial outsourcing, insourcing, or resourcing. For rising costs of outsourcing, see Choi and Yu (2017).

outsourcing could raise aggregate employment, but it may further exacerbate the resource misallocation; Noting that the HT (1970) model was first introduced to explain the rural-urban (geographical) migration and urban unemployment problems of the developing countries in the Sub-Saharan African region, the model's applicability later turns out to be much broader than that the model was originally designed for. To be specific, regardless of the stage of economic development and the type of the sectoral migration, the HT model seems to be applicable to any country with unemployment and sectoral migration issues caused by institutional factors (such as labor unions, minimum wage and sectoral wage differentials). This is why the HT model is often regarded as the most successful general equilibrium model next to the standard HO Model, and hence, it is enlightening to deliberate outsourcing issue in the context of the HT model; Lastly, since full-employment implies no unemployment, the HO model can be analytically regarded as a special case of the HT model where unemployment and wage differentials do not exist – thus it is imperative to study outsourcing issue in the general case of the HT model.

We obtain several important results from the analyses. Unlike the common view that outsourcing gives rise to negative (positive) effect to the domestic employment and income-distribution (country's welfare), its effects on those crucial variables depend on the sector in which outsourcing occurs, whereby sectoral factor abundance, outsourcing-unemployment response and the dynamic stability condition play crucial roles. In particular, outsourcing in the manufacturing (primary) sector widens (reduces) income inequality by increasing (decreasing) the sectoral wage gap and raising (not affecting) the rental income of the capital owners in the economy. Moreover, outsourcing in the manufacturing (primary) sector can be welfare-decreasing (is always welfare-increasing) due to its negative (positive) employment effect mitigating (reinforcing) the primary gains from the outsourcing. Noting that international outsourcing serves as a key force for production fragmentation and global value chain formation for various interest groups involving in trade, our results should have strong implications for the current de-globalization and the US-Sino trade disputes.

II. THE MODEL AND ITS ASSUMPTIONS

Consider an economy with two sectors: a traditional sector (Sector 1) producing a primary-good in the amount of X_1, and a modern sector (Sector 2) producing a manufactured good in the amount of X_2. Each sector utilizes two factors, labor and

capital, that are fixed in supply, and perfectly mobile between the sectors. Flexible rental rate (r) ensures full-employment of capital, but labor is fully employed only in the traditional sector where the real wage rate (w_1) is flexible. In the modern sector where the real wage (w_2) is rigid (due to an institutional factor such as labor union and minimum wage), unemployment exists. The production functions for the two sectors are expressed as

$$X_i = A_i F_i(L_i, K_i) = A_i L_i f_i(k_i) \quad i = 1, 2 \tag{1}$$

where L_i and K_i are labor and capital employed by sector i, F_i is linearly homogeneous in its inputs and subject to the law of diminishing returns, $k_i = (= K_i / L_i)$is its capital-labor ratio, f_i is F / L_i for $i = 1, 2$. A_i ($i = 1, 2$) is the outsourced factor (i.e., factor-augmenting element derived from the outsourced goods and services) in sector i, and initially equals to unity in the absence of outsourcing. A_i-1 is the effective quantity of services supplied by the outsourced factors there. Since a firm's decision to outsourcing can actually be driven by a variety of factors including (but not limited to) lower labor costs, we assume that in the production process of goods and services, A_i augments the whole production process by enhancing the productivities of both labor (L_i) and capital (K_i) for $i = 1, 2$. To be specific, as the firms in sector i engage in outsourcing, A_i rises above its value of unity, and renders factor-augmenting effect to the sector's productivity. That is, A_i is a control variable of X_i producers that increases with the volume of outsourcing. Further, $dA_i = 0$ in the absence of outsourcing, and $dA_i > 0$ in the presence of an additional outsourcing in sector i.

Differentiating (1) yields

$$dX_i = A_i F_{Li} dL_i + A_i F_{Ki} dK_i + F_i dA_i \qquad i = 1, 2 \tag{2}$$

where F_{Li} and F_{Ki} respectively denote the partial derivatives of F_i with respect to labor and capital.

Perfect capital mobility results in identical rental rates, equal to the values of marginal product of capital, in each sector:

$$r = A_1 F_{K1} = pA_2 F_{K2}$$
$$\text{or } r = A_1 f_1^{'}(k_i) = pA_2 f_2^{'}(k_2) \tag{3}$$

where $f_i^{'}$ is the derivative of f_i with respect to k_i (i=1,2), $p = p_2 / p_1 = p_2$ is the relative price of the manufactured good in terms of the primary good, and $p_1 = 1$ initially. Then, the marginal revenue product (or the value of the marginal product) of the outsourced factors (A_i) can be written as $a_i = p_i(\partial X_i / \partial A_i) = p_i F_i > 0$. Meanwhile, unlike the (basic) factor and product markets in the outsourcing country, we assume that the international outsourcing markets are imperfectly competitive because of increasing opportunity costs. For example, as a firm expands outsourcing, additional amount of outsourced factors become available only from more expensive vendors, or more outsourced factors should replace higher-productivity (or lower cost) domestic factor units. Denoting the marginal cost of the outsourced factors (MC_i) as $b_i^* = b_i + (A_i - 1)(\partial b_i / \partial A_i)$, this implies $db_i/dA > 0$ (i =1. 2) and $b_i^* > b_i$.[6]

We further postulate $A_i = A_{io} + A_i(a_i, b_i)$ where A_{io} is an exogenous (or autonomous) component of outsourcing and $A_i(a_i, b_i)$ an endogenous component responding to a_i and b_i. This is similar to the standard macroeconomics procedure used to obtain the consumption and import multipliers. Since outsourcing firms make profit-maximizing decision based on the value of the marginal revenue product [$a_i = p_i \partial X_i / \partial A = p_i L_i f_i(k_i)$] and marginal cost ($b_i^*$), additional outsourcing lowers the firm's unit cost only when $a_i > b_i^*$ and hence $A_i > 1$. For all values of A_i for which $a_i \leq b_i^*$, the firms would not undertake an additional outsourcing (A_i=1).

[6] Law of increasing opportunity costs states that once all factors of production are used with maximum efficiency, additional output will cost more than the average. As production increases, the opportunity cost does as well. In light of the general law of increasing opportunity cost, we postulate that b_i is an increasing function of A_i. In addition, in section 3.2, we analyze the case of constant opportunity cost, where the outsourcing markets are perfectly competitive.

The wage rates between the two sectors are usually unequal in the HT economy, and labor allocation are determined also by marginal product pricing,

$$w_1 = A_1 F_{L1} = A_1(f_1 - k_1 f_1^{'})$$
$$\text{and} \quad \overline{w}_2 = pA_2 F_{L2} = pA_2(f_2 - k_2 f_2^{'}), \tag{4}$$

Applying the now well-known HT hypothesis of labor movement, labor migrates from the primary sector (sector 1) to the manufacturing sector (sector 2) until the actual wage of the former sector equals the expected wage of the latter sector, which is the institutionally-set minimum wage ($\overline{w}_2$) times the probability of finding a job there. Let λ be the ratio of unemployed (L_U) to employed (L_2) in sector 2. Then, $L_2 + L_U = L_2(1+\lambda)$. The labor market equilibrium implies

$$(1+\lambda)w_1 = \overline{w}_2$$
$$\text{where} \quad \overline{w}_2 > w_1 \text{ initially.} \tag{5}$$

The employment condition in factor markets can be written as

$$L_1 + L_2 + L_U = L_1 + (1+\lambda)L_2 = L, \tag{6}$$

$$K_1 + K_2 = K, \tag{7}$$

where L and K are fixed supplies of labor and capital, respectively.

The demand side of the model is given by the social utility function (U), which is dependent on the consumption for the two commodities (D_1 and D_2) such that $U = U(D_1, D_2)$ where $U_i > 0$ and $U_{ii} < 0$ for $i = 1,2$. The economy's budget constraint stipulates that the total value of expenditure is determined by the value of national income:

$$E(p, U) = I, \tag{8}$$

where I [$= X_1 + p X_2 - b_1(A_1 - 1) - b_2(A_2 - 1)$] is the national income expressed in terms of good 1, and $b_i(A_i - 1)$ is the payment for the outsourced factors by sector i (i =

1,2). Assume free trade so that the domestic prices and the international prices of the traded goods are synchronized at the ratio of p. Totally differentiating (8), we obtain the expression for the welfare effect (dW) of the outsourcing country.

$$dW = E_U\, dU = dX_1 + p\, dX_2 - E_2\, dp - b_1 dA_1 - b_2 dA_2 - (A_1\text{-}1)db_1 - (A_2\text{-}1)db_2 \tag{9}$$

where $E_p = \partial E/\partial p = D_2$, and $E_2 = D_2 - X_2$ denotes the excess demand in sector 2.

This completes the specification of our model allowing for the presence of unemployment in an outsourcing economy. The model is now utilized to study the implications of international outsourcing occurring in either the manufacturing or the primary-good sector (primary sector, henceforth) of the outsourcing country.

III. OUTSOURCING IN MANUFACTURING SECTOR

Suppose that an autonomous outsourcing takes place by the firms in the manufacturing sector (sector 2) only, i.e., $A_2 > 1$, $dA_2 > 0$, $A_1 = 1$, and $dA_1 = 0$. Henceforth, for notational simplicity, let $A_2 = A$ and $dA_2 = dA$. For the comparative static analyses, equation (3) - (5) are reduced to a system of three equations:

$$f_1' = pAf_2' \tag{10}$$

$$pA(f_2 - k_2 f_2') = \overline{w}_2 \tag{11}$$

$$(1+\lambda)(f_1 - k_1 f_1') = \overline{w}_2 . \tag{12}$$

The above three equations consist of 3 endogenous variables (k_1, k_2 and λ) and 2 parameters p and A. Thus we can solve for the unknowns: $k_i = k_i(p, A)$ (i=1, 2) and $\lambda = \lambda(p, A)$. Totally differentiating (10) - (12) and expressing in matrix form,

$$\begin{pmatrix} f_1'' & -pAf_2'' & 0 \\ 0 & -pAk_2 f_2'' & 0 \\ -(1+\lambda)k_1 f_1'' & 0 & f_1 - k_1 f_1' \end{pmatrix} \begin{bmatrix} dk_1 \\ dk_2 \\ d\lambda \end{bmatrix} = \begin{bmatrix} Af_2' dp + pf_2' dA \\ -AF_{L2} dp - pF_{L2} dA \\ 0 \end{bmatrix}. \tag{13}$$

The determinant of the coefficient matrix in (13) is

$$D = -w_1 pAk_2 f_1'' f_2'' < 0 \tag{14}$$

because $f_i'' < 0$ due to diminishing marginal returns.

1. Sectoral Employment (Unemployment), Factor Prices and Output

The effect of an exogenous change in good price at constant level of outsourcing, and of outsourcing in the manufacturing sector at constant good prices can now be determined.

By using Cremer's rule, (13) can be solved for dk_1, dk_2 and $d\lambda$. At constant level of outsourcing ($dA = 0$), we obtain

$$\partial k_1 / \partial p = -pA^2 f_2 F_{L1} f_2'' / D < 0 \tag{15}$$

$$\partial k_2 / \partial p = -pAF_{L1} F_{L2} f_1'' / D < 0 \tag{16}$$

$$\partial \lambda / \partial p = -(1+\lambda) pA^2 k_1 f_2 f_1'' f_2'' / D > 0. \tag{17}$$

Holding good prices constant ($dp = 0$), we derive

$$\partial k_1 / \partial A = -p^2 Af_2 F_{L1} f_2'' / D < 0. \tag{18}$$

$$\partial k_2 / \partial A = -pF_{L1} F_{L2} f_1'' / D < 0 \tag{19}$$

$$\partial \lambda / \partial A = -(1+\lambda) p^2 Ak_1 f_2 f_1'' f_2'' / D > 0. \tag{20}$$

It is clear that an increase in the relative price of the manufacturing good and an increase in outsourcing in the manufacturing sector have similar effects on sectoral factor intensities and unemployed-employed ratio of the manufacturing sector. That is, an increase in p and A lowers capital-labor ratio in both the two sectors and raises the unemployed-employed ratio in the manufacturing sector.

The labor allocation effect of a change in the good price or the level of outsourcing can now be obtained. Differentiating (6) and (7) with respect to p holding the level of outsourcing constant ($dA = 0$), we derive

$$\partial L_1 / \partial p = [k_2 - (1+\lambda)k_1]^{-1}[(1+\lambda)(L_1\partial k_1 / \partial p + L_2\partial k_2 / \partial p) - k_2 L_2 \partial\lambda / \partial p] \tag{21}$$

$$\partial L_2 / \partial p = -[k_2 - (1+\lambda)k_1]^{-1}[L_1\partial k_1 / \partial p + L_2\partial k_2 / \partial p - k_1 L_2 \partial\lambda / \partial p]. \tag{22}$$

Differentiating (6) and (7) with respect to A holding p constant, we obtain

$$\partial L_1 / \partial A = [k_2 - (1+\lambda)k_1]^{-1}[(1+\lambda)(L_1\partial k_1 / \partial A + L_2\partial k_2 / \partial A) - k_2 L_2 \partial\lambda / \partial A] \tag{23}$$

$$\partial L_2 / \partial A = -[k_2 - (1+\lambda)k_1]^{-1}[L_1\partial k_1 / \partial A + L_2\partial k_2 / \partial A - k_1 L_2 \partial\lambda / \partial A]. \tag{24}$$

Noteworthy is that the signs of (21) - (24) depends on the sign of the denominator, $k_2 - (1+\lambda)k_1$. If $k_2 - (1+\lambda)k_1$ is positive (negative), then $\partial L_1 / \partial p$ and $\partial L_1 / \partial A$ are both negative (positive) and $\partial L_2 / \partial p$ and $\partial L_2 / \partial A$ are both positive (negative). Here, the meaning of $k_2 - (1+\lambda)k_1$ is crucial. Neary (1981) demonstrated that the neoclassical HT model is stable if and only $k_2 - (1+\lambda)k_1 > 0$, which he interpreted as "manufacturing is capital intensive relative to primary sector in value sense."

Later, McCool (1982) noted that Neary's dynamic stability condition, $k_2 - (1+\lambda)k_1 > 0$, implies that manufacturing is "capital-abundant" relative to primary sector."

Similarly, as will be shown next, the effect of a change in p and A on sectoral outputs depends on whether the manufacturing is capital abundant or not. To simplify notations, let $\alpha = k_2 - (1+\lambda)k_1$ henceforth.

Now, we can determine the effect of a change in p and A on sectoral outputs. Differentiating (1) with respect to p holding A constant and using (15), (16), (21) and (22), we obtain

$$\partial X_1 / \partial p = f_1 \partial L_1 / \partial p + L_1 f_1^{'} \partial k_1 / \partial p = \alpha^{-1} \{\partial k_1 / \partial p [L_1 f_1^{'} \alpha + f_1 (1+\lambda) L_1] - f_1 [L_2 f_2 \partial \lambda / \partial p - (1+\lambda) L_2 (\partial k_2 / \partial p)]\} \quad (25)$$

$$\partial X_2 / \partial p = A f_2 \partial L_2 / \partial p + A L_2 f_2^{'} \partial k_2 / \partial p = -A\alpha^{-1} \{f_2 [L_1 \partial k_1 / \partial p - k_1 L_2 \partial \lambda / \partial p] + L_2 [F_{L2} + f_2^{'} (1+\lambda)] k_1 (\partial k_2 / \partial p)\} . \quad (26)$$

Similarly, differentiating (1) with respect to A holding p constant and utilizing (18), (19), (23) and (24), we derive

$$\partial X_1 / \partial A = f_1 \partial L_1 / \partial A + L_1 f_1^{'} \partial k_1 / \partial A = \alpha^{-1} \{\partial k_1 / \partial A [L_1 f_1^{'} \alpha + f_1 (1+\lambda) L_1] - f_1 [L_2 k_2 \partial \lambda / \partial p - (1+\lambda) L_2 (\partial k_2 / \partial A)]\} \quad (27)$$

$$\partial X_2 / \partial A = L_2 f_2 + A f_2 \partial L_2 / \partial A + A L_2 f_2^{'} = L_2 f_2 - \alpha^{-1} A \{f_2 [L_1 \partial k_1 / \partial A - k_1 L_2 \partial \lambda / \partial A] + L_2 [F_{L2} + f_2^{'} (1+\lambda) k_1] (\partial k_2 / \partial A)\} . \quad (28)$$

Equations (25) - (26) show that the sectoral output will respond positively to a change in its relative price in a dynamically stable system, i.e., $\partial X_1 / \partial p < 0$ and $\partial X_2 / \partial p > 0$ if $\alpha > 0$. The price-output response is perverse if $\alpha < 0$. Similarly, (27) and (28) reveal that outsourcing in manufacturing will increase the manufacturing output and decreases the primary-good output in a dynamically stable system, i.e., $\partial X_1 / \partial A < 0$ and $\partial X_2 / \partial A > 0$ if $\alpha > 0$. Therefore, it follows that the output effect of outsourcing in manufacturing is ultra-biased in a stable system (i.e., it increases the output of the manufactured good and decrease that of the other sector).

We now turn our attention to the effect of outsourcing on income distribution and employment (or unemployment), which is a major subject matter for the present paper.[7] First, we examine the effect of outsourcing in manufacturing on factor prices

[7] For example, the importance of outsourcing for employment (though not unemployment) and income distribution is well explained in Mankiw et al. (2004), Jones (2005), and Yabuuchi (2011). For a more complex situation of international outsourcing in a global setting, see, for example, the recent work by Antras (2019).

(i.e., wage rate in the primary sector and economy's rental rate). Differentiating (3) and (4) with respect to A yields

$$\frac{dw_1}{dA} = -k_1 f_1'' \frac{dk_1}{dA} < 0$$
$$\frac{dr}{dA} = f_1'' \frac{dk_1}{dA} > 0. \tag{29}$$

Since $dk_1 / dA < 0$ from (18), it is obvious that $dw_1 / dA < 0$ and $dr / dA > 0$. That is, an increase in outsourcing in manufacturing lowers the wage rate in the primary sector and hence widens sectoral wage gap $(\overline{w}_2 - w_1)$, while increasing the rental income of the capital owners. Next, to analyze the outsourcing effect on unemployment in the manufacturing sector, we differentiate $\lambda = L_U / L_2$ and obtain

$$\frac{dL_U}{dA} = L_2 \frac{d\lambda}{dA} + \lambda \frac{dL_2}{dA} > 0, \tag{30}$$

which is necessarily positive in light of $d\lambda / dA > 0$ and $dL_2 / dA > 0$ in a stable system as (20) and (24) show. That is, in a stable system, an increase in outsourcing in the manufacturing sector increases unemployment in the manufacturing sector $(dL_U / dA > 0)$ and the economy, and decreases the total employment $(L_1 + L_2)$ of the economy since $dL_1 / dA + dL_2 / dA = (dL - dL_U) / dA = -dL_U / dA < 0$.

Therefore, we can state the following proposition.

Proposition 1. In the HT economy, outsourcing in the manufacturing sector decreases the wage rate, employment, output of the primary sector, while it increases the unemployment, employment and output in the manufacturing sector and the rental income of the economy. Therefore, inequality of income-distribution is widened as the sectoral wage gap, total unemployment and rental income of capital owners all increase.

An intuitive explanation of Proposition 1 is as follow:

As is well known, for a general equilibrium system to be stable, resources must flow from the higher productivity sector to the lower sector to maintain efficiency. Noting

that outsourcing increases the productivity of the outsourcing sector, the output effects of outsourcing should be ultra-biased such that it increases the output of the outsourcing sector and decreases that of the other sector. For example, outsourcing in the manufacturing sector increases the output of the manufactured good and decreases the output of the primary goods. As this happens, resources (i.e., labor and capital) should shift from the primary sector (sector 1) to manufacturing sector (sector 2). However, HT model assumes $w_2 > w_1$ due to institutional reasons, and labor market equilibrium is established when $w_2 = (1+\lambda)w_1$. As noted above, under this situation, Neary (1981) shows that system stability of the HT model requires that sector 2 is not only capital-intensive in physical sense ($k_2 > k_1$) but also in the value sense [$k_2 > (1+\lambda)k_1$]. Now we can provide some compelling reasons why the results in Proposition 1 can be expected. First, noting that outsourcing in the manufacturing sector (sector 2) increases the output of the sector and decreases that of the other (sector 2), resources (both L and K) shift from sector 1 to sector 2 accordingly. However, since $k_2 > k_1$, sector 1 should give up to sector 2 more K and less L than the original $k_1=K_1/L_1$ level, so k_1 goes down (i.e., $dk_1/dA < 0$). In the meantime, sector 2 gains both L and K from sector 1. But since $k_2 > k_1$, sector 2 gains less K and more L than the original $k_2 = K_2/L_2$ level, so k_2 goes down (i.e., $dk_2/dA < 0$). Since factor prices (w_1 and r) are dependent on k_1 such that the decrease in k_1 lowers labor productivity and increases capital productivity, w_1 goes down and r goes up as k_1 goes down [as equations (29) show]. Since a labor market equilibrium is established when $w_2 = (1+\lambda)w_1$ where w_2 is institutionally given ($dw_2 = 0$), we obtain $w_1 d\lambda = -(1+\lambda)dw_1$ which implies w_1 and λ (unemployed-employed ratio in sector 2) are inversely related. Hence, it is obvious that the outsourcing increases the unemployed-employed ratio in sector 2, i.e., $d\lambda/dA > 0$. With this intuitive reasoning, other comparative static results can be similarly traced using the relevant equations.

2. Welfare Effect

We now analyze the welfare effect of outsourcing occurring in the manufacturing sector. Since the international commodity markets is assumed to be competitive, the

terms of trade (p) are given to the outsourcing country (i.e., $dp = 0$).[8] Differentiating (9) with respect to A, we obtain

$$\frac{dW}{dA}=\frac{dX_1}{dA}+\frac{pdX_2}{dA}-b_2-(A-1)(\frac{\partial b}{\partial A})=\frac{dX_1}{dA}+\frac{pdX_2}{dA}-b_2^*$$

which, using (2) - (7), can be rewritten as

$$\begin{aligned}\frac{dW}{dA}&=\frac{F_{L1}dL_1+F_{K1}dK_1+pAF_{L2}dL_2+pAF_{K2}dK_2+pF_2dA}{dA}-b_2^*\\&=\frac{w_1dL_1+rdK_1+(1+\lambda)w_1[(-dL_1-L_2d\lambda)/(1+\lambda)]-rdK_1+pF_2dA}{dA}-b_2^*\\&=a_2-b_2^*-w_1L_2\frac{d\lambda}{dA}. \qquad (31)\end{aligned}$$

Equation (31) shows that the welfare effect of outsourcing in the manufacturing sector consists of three component effects: a_2 the marginal revenue product (or the marginal benefit) of outsourced factor (A), b_2^* the marginal cost of outsourced factors, and $-w_1L_2(d\lambda/dA)$ the employment effect of outsourcing in the manufacturing sector. To maximize profits, firms should engage in additional outsourcing if a_2 exceeds b_2^*. In the HO model of full-employment where unemployment is nil ($d\lambda/dA=0$), (31) reduces to $dW/dA=a_2-b_2^*$. Therefore, additional outsourcing by the private firms (which occurs when $a_2 > b_2^*$) is always welfare-increasing for the outsourcing country (i.e., $dW/dA > 0$). This is the result obtained by Choi and Beladi (2014) for the labor-augmenting outsourcing in the manufacturing sector under the HO full-employment regime. However, equation (31) shows that in the HT model of unemployment, this result of welfare-increasing outsourcing in the manufacturing

[8] A large country in the international commodity market can affect the terms of trade (p) via changing its import demand. Therefore, to analyze the terms of trade effect of outsourcing on the import demand, the terms of trade need to be initially held constant. See, for example, Hazari (1978, chapter 5) for a similar procedure used for the case of technical progress. See Choi and Yu (1985).

sector may break down. To be specific, in the HT model, outsourcing in the manufacturing sector increases unemployed-employed ratio in the sector ($d\lambda / dA > 0$), and hence the employment effect in (31), $-w_1 L_2 (d\lambda / dA)$, is negative. Therefore, if the negative employment effect of outsourcing in the manufacturing sector is so strong that it outweighs the positive marginal gain of the outsourcing firms from additional outsourcing ($a_2 - b_2^* > 0$), the outsourcing in the manufacturing sector should be welfare-decreasing (i.e., immiserizing) for the outsourcing country. To examine the condition for this perverse welfare result, we rewrite (31) using (20) as

$$\frac{dW}{dA} = a_2 - w_1 L_2 \frac{d\lambda}{dA} - b_2^* = a_2 - pL_2 f_2 (1+\lambda)(k_1 / k_2) - b_2^* =$$
$$= a_2 [\frac{k_2 - (1+\lambda)k_1}{k_2}] - b_2^* \gtrless 0 . \tag{32}$$

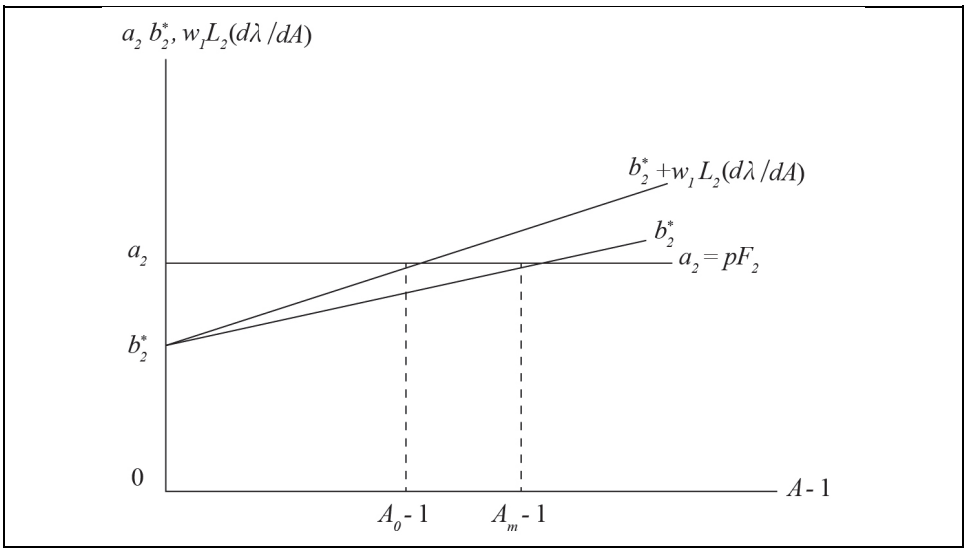
Therefore, $dW/dA \gtrless 0$ according as $a_2 \gtrless [\frac{k_2}{k_2 - (1+\lambda)k_1}] b_2^*$. That is, the outsourcing country becomes worse-off if the outsourcing occurs in the manufacturing sector and the value of the marginal product of the outsourced factors (a_2) falls short of the marginal cost for the outsourced factors (b_2^*) times $k_2 / [k_2 - (1+\lambda)k_1]$.

This implies that in the presence of unemployment, there exists an optimum level of outsourcing that maximizes the social welfare. Since the social welfare is maximized when $dW/dA = 0$, the optimum outsourcing in the manufacturing sector under unemployment (with payment for the outsourced factors) is given by

$$a_2 = [\frac{k_2}{k_2 - (1+\lambda)k_1}] b_2^* . \tag{33}$$

Here, equation (33) represents the necessary condition for the optimal level of outsourcing for the outsourcing country, and it can occur only when there exists a continuous outsourcing range (A-1) at which the MRP of the outsourced factors (a_2) exceeds the (unemployment cost - inclusive) social costs of the factors, $b_2^* + w_1 L_2 (d\lambda / dA)$.

Figure 1. Optimum Outsourcing in Manufacturing Sector



The optimum outsourcing in the manufacturing sector is graphically explained in Figure 1. In equation (1), we assume that the productions functions of the outsourcing firms are linearly homogeneous, and outsourcing (A) is factor-augmenting in the neutral manner. Then, the demand (i.e., the marginal revenue product) curve for outsourced factor (A), $a_2 = p\partial X_2 / \partial A = pF_2 = pL_2f_2$, is a positive constant with respect to A, i.e., perfectly elastic with respect to A (or A -1) axis. Meanwhile, we assume that the international outsourcing market is imperfectly competitive, and hence the supply curve of A (b_2 curve) rises with A. Then the MC curve of A [$b_2^* = b_2 + (A-1)(\partial b_2 / \partial A)$] is up-sloping and above the supply curve of A (i.e., b_2). The market equilibrium level of outsourcing is determined by private firms based on their own marginal benefit (a_2) and marginal cost (b_2^*) without considering the outsourcing-induced employment effect [$-w_1L_2(d\lambda / dA)$], and hence market equilibrium level of outsourcing is A_m - 1 in Figure 1. However, in the present model of HT-type unemployment, the marginal cost to the society is the sum of the marginal cost to the firm (b_2^*) and the outsourcing-induced unemployment cost [$w_1L_2(d\lambda / dA) > 0$] which are both up-sloping with respect to A, (that is, the private

marginal cost plus the spillover unemployment cost). Therefore, in Figure 1, the socially optimum level of outsourcing is A_o -1 which is below the market equilibrium level of outsourcing (A_m-1). In short, in the presence of outsourcing in the manufacturing sector, over-outsourcing occurs in the market. Thus the following proposition can be stated:

Proposition 2: In the presence of unemployment, outsourcing in the manufacturing sector can be immiserizing if the net gains from the outsourcing firms ($a_2 - b_2^*$) are outweighed by the negative employment effect induced by the outsourcing, and hence, an optimum outsourcing exists.

Thus far, we assume the general case where the outsourcing markets are imperfectly competitive. Now, we briefly turn our attention to the special case of perfectly competitive outsourcing market. For the purpose, we continue to assume that outsourcing occurs in the manufacturing sector. In this case, the supply of the outsourced factors are perfectly elastic at the fixed market price (b_2), and hence $b_2 = b_2^*$. Then, both the demand (a_2) and supply (b_2) curves of the outsourced factors are constant with respect to A (or A-1), and outsourcing should result in specialization of the manufactured good or no outsourcing. The reasons are as follows: First, consider the case where $a_2 > b_2$. Then, the firms in sector 2 should outsource indefinitely to increase their profits, and this increases the output of the manufacture good at the expense of the primary good [i.e., $dX_2 / dA > 0$ and $dX_1 / dA < 0$ as equations (27) and (28) show] until the economy reaches at the point of specialization where only the manufactured good and no primary good are produced. In this special case, a unique level of optimum outsourcing for the society can still exist (below the level of complete outsourcing) because the social supply curve of A (inclusive of the employment effect), $b_2 + w_1 L_2 (d\lambda / dA)$, is up-sloping with respect to A. Next is the case where $a_2 < b_2$ for all A (or A-1), and hence no outsourcing occurs. If the country uses free trade policy, the country should be under the conventional state of free trade without outsourcing.[9]

[9] Using the same methodology, we can consider outsourcing in the special case of primary sector under perfectly competitive outsourcing market. We skip presenting detailed analysis. However, we intuitively deduce that either complete specialization in the primary good or a state of free trade with no outsourcing ensues. Further, there will neither be an interior solution for the market equilibrium level of outsourcing nor a socially optimum level of outsourcing because additional outsourcing always increases the welfare.

Now, before discussing outsourcing in the primary sector, it should be worthwhile to compare our present welfare result of outsourcing with the Beladi and Naqvi's result (1988) that economic growth (either from factor growth and technological progress) cannot be immiserizing in the HT model of unemployment. The BN (1988) case of autonomous growth and the present case of outsourcing differ in that the BN case involves no payments for the growth while the present case of outsourcing involves payments for it (i.e., outsourcing). Noting that the BN (1988) case can be regarded as a special case where the payment for the growth is nil, it is a simple matter to verify the BN result by setting the cost of outsourcing or growth (b_2^*) equal to zero in the present outsourcing model.[10]

IV. OUTSOURCING IN PRIMARY SECTOR

Suppose now outsourcing occurs at the primary sector (sector 1) instead of the manufacturing sector, so that $A_1 > 1$, $dA_1 > 0$ and $dA_2 = dA = 0$. Then, the basic system of equations (3) - (5) reduces to

$$A_1 f_1^{'} = p f_2^{'} \tag{34}$$

$$p(f_2 - k_2 f_2^{'}) = \overline{w}_2 \tag{35}$$

[10] The BN (1988) case of autonomous growth is relegated to this note because it is not a main subject of outsourcing. Choi and Yu (1992), taking the BN (1988) case of technological progress in manufacturing as an example, demonstrated that if it involves no payment (here, b_2^* = 0), the welfare effect in (32) reduces to

$dW / dA = a_2 - w_1 L_2 (d\lambda / dA) = = a_2[k_2 - (1+\lambda)k_1] / k_2$,

which is necessarily positive in a dynamically stable system where $k_2 - (1+\lambda)k_1 > 0$. That is, in a stable system, the marginal benefit of the growth (a_2> 0) always dominates the negative employment effect of the growth [$-w_1 L_2 (d\lambda / dA) < 0$], and hence the technological progress in manufacturing is necessarily welfare-increasing. Meanwhile, technological progress in agriculture in the HT model renders positive employment effect, and hence, coupled with the main growth effect (a_2>0), it is always welfare-improving. See BN (1988) and Choi and Yu (1992), respectively for a graphical and a mathematical proof of the BN result.

$$(1+\lambda)A_1(f_1 - k_1 f_1^{'}) = \overline{w}_2 . \tag{36}$$

Totally differentiating (34)- (36) and expressing in matrix firm, we obtain

$$\begin{bmatrix} A_1 f_1^{''} & -pf_2^{''} & 0 \\ -A_1(1+\lambda)k_1 f_1^{''} & 0 & A_1(f_1 - k_1 f_1^{'}) \\ 0 & -pk_2 f_2^{''} & 0 \end{bmatrix} \begin{bmatrix} dk_1 \\ dk_2 \\ d\lambda \end{bmatrix} = \begin{bmatrix} f_2^{'}dp - f_1^{'}dA_1 \\ -F_{L1}(1+\lambda)dA_1 \\ -F_{L2}dp \end{bmatrix}. \tag{37}$$

The determinant of the coefficient matrix of (37) is

$$D_1 = A_1 pk_2 f_1^{''} f_2^{''} w_1 > 0$$

Since the rest of the analyses involve essentially the same procedure as the previous section, we relegate the main results to the Appendix and summarize our major findings here:

(1) Regardless of the stability of the system,
   (a) outsourcing in the primary sector raises (does not affect) the capital-labor ratio of the primary (manufacturing) sector, and reduces the unemployed-employed ratio (λ) in the manufacturing sector;
   (b) outsourcing in the primary sector increases the wage rate in the sector, but has no effect on the economy's rental rate. Therefore, the income inequality resulting from the sectoral wage gap ($w_2 - w_1$) decreases.

(2) Under a dynamically stable system [$k_2 - (1+\lambda)k_1 > 0$],
   (a) the effects of outsourcing in the primary sector is ultra-biased on sectoral employment and outputs (i.e., it increases employment and output of the primary sector and decrease those of the other sector). This result breaks down in an unstable system [where $k_2 - (1+\lambda)k_1 < 0$] even if $k_2 > k_1$.
   (b) unlike outsourcing in manufacturing, outsourcing in the primary sector always improves the welfare of the outsourcing country because its primary outsourcing gain ($a_1 - b_1^* > 0$) is reinforced by the employment gain from the decrease in the unemployed-employed ratio in the manufacturing sector.

Therefore, optimum outsourcing does not exist for this case of outsourcing.

Proposition 3: In the presence of the HT type unemployment, outsourcing in the primary sector narrows the income inequality by reducing the sectoral wage gap (w_2–w_1) while not affecting the rental income of the capital owners. Further, outsourcing in the primary sector always increases the welfare of the outsourcing country by rendering positive employment effect $[-w_1 L_2 (d\lambda / dA_1) > 0]$ which reinforces the primary gains from the outsourcing ($a_1 - b_1^*$).

V. CONCLUSIONS

This paper has examined the effects of international outsourcing on unemployment, income distribution and welfare. Using the Harris-Todaro (1970) model of unemployment, it shows that the effects of outsourcing on employment, income-distribution, and welfare depend on the sector in which the outsourcing occurs, whereby sectoral factor intensities, unemployment-outsourcing response and the dynamic stability condition play crucial roles. In particular, outsourcing in the manufacturing (primary) sector widens (reduces) income inequality by increasing (decreasing) the sectoral wage gap and raising (not affecting) the rental income of the capital owners in the economy. Moreover, outsourcing in the manufacturing (primary) sector can be welfare-decreasing (is always welfare- increasing) due to its negative (positive) employment effect mitigating (reinforcing) the primary gains from the outsourcing, so, an optimum outsourcing exists (does not exist) for the case.

APPENDIX

This appendix presents the results obtained from comparative static analyses on outsourcing occurring in the primary sector (i.e., traditional sector) only.

$$\partial k_1 / \partial A_1 = -A_1 p k_2 F_{L1} f_1^{'} f_2^{''} / D_1 > 0$$
$$\partial k_2 / \partial A_1 = 0$$
$$\partial \lambda / \partial A_1 = -A_1 p k_2 f_1 (1+\lambda) f_1^{''} f_2^{''} / D_1 < 0$$
$$\partial w_1 / \partial A_1 = -k_1 f_1^{''} dk_1 / dA_1 > 0$$
$$\partial r / \partial A_1 = p f_2^{''} dk_2 / dA_1 = 0$$
$$\partial L_1 / \partial A_1 = (\alpha)^{-1}[(1+\lambda)(L_2 \partial k_1 / \partial A_1 - k_2 L_2 \partial \lambda / \partial A_1] > 0$$
$$\partial L_2 / \partial A_1 = -(\alpha)^{-1}[L_1 \partial k_1 / \partial A_1 - k_1 L_2 \partial \lambda / \partial A_1] < 0 .$$
$$\partial X_1 / \partial A_1 = L_1 f_1 - (A_1 f_1 k_2 L_2 / \alpha) \partial \lambda / \partial A_1$$
$$+[A_1 f_1 L_1 (1+\lambda) + A_1 L_1 f_1^{'} \alpha](\partial k_1 / \partial A_1)(\alpha)^{-1} > 0$$
$$\partial X_2 / \partial A_1 = f_2 \partial L_2 / \partial A_1) < 0$$
$$dW / dA_1 = a_1 - b_1 - w_1 L_2 (d\lambda / dA_1) > 0 .$$

REFERENCES

Antras, P. 2019. Global Value Chain: The Economics of Spiders and Snakes. IEFS-EAER Conference Proceedings. vol. 4, pp. 30-57.

Batra, R. and H. Beladi. 2010. "Outsourcing and the Heckscher-Ohlin Model," *Review of International Economics*, vol. 18, no. 2, pp. 277-288.

Beladi, H. and N. Naqvi. 1988. "Urban Unemployment and Non-Immiserizing Growth," *Journal of Development Economics*, vol. 28, no. 3, pp. 365 - 376.

Bhagwati, J., Panagariya, A. and T. N. Srinivasan. 2004. "The Muddles Over Outsourcing," *Journal of Economic Perspectives*, vol. 18, no. 4, pp. 93-114.

Chao, C.-C. and E. S. H. Yu. 1993. "Content Protection, Urban Unemployment and Welfare," *Canadian Journal of Economics*, vol. 26, no. 2, pp. 481-492.

Choi, J.-Y. and H. Beladi. 2014. "Internal and External Gains from International Outsourcing," *Journal of International Trade and Economic Development*, vol. 23, no. 2, pp. 299-314.

Choi, J.-Y. and E. S. H. Yu. 1985. "Technical Progress, Terms of Trade and Welfare under Variable Returns to Scale," *Economica*, vol. 52, no. 207, pp. 365-377.

_____. 1992. Technical Progress, Terms of Trade and Welfare in a Mobile Capital Harris-Todaro Model. In Neuefeind, W. and R. Riezman. (eds.) *Economic Theory and International Trade: Essays in Memoriam of J. Trout Radar*. New York: Springer Verlag. Chapter 6, pp. 129-142.

_____. 2017. International Outsourcing, Environment Costs, and Welfare. Asia Pathways. The Blog of Asian Development Bank Institute (ABDI). December. <https://www.asia pathways-adbi.org/2017/12/internationaloutsourcing-environmental-costs-and-welfare/> (accessed July 25, 2019)

Deardorff, A. 2001. "International Provision of Trade Services, Trade, and Fragmentation," *Review of International Economics*, vol. 9, no. 2, pp. 233-248.

Egger, H. and P. Egger. 2003. "Outsourcing and Skill-Specific Employment in a Small Economy, Austria After the Fall of the Iron Curtain," *Oxford Economic Papers*, vol. 55, no. 4, pp. 625-643.

Feenstra, R. C. 1998. "Integration and Disintegration of Production in the Global Economy," *Journal of Economic Perspectives*, vol. 12, no. 4, pp. 31-50.

Grossman, G. M. and E. Rossi-Hansberg. 2008. "Trading Tasks: A Simple Theory of Offshoring," *American Economic Review*, vol. 98, no. 5, pp. 1978-1997.

Harris, J. R. and M. P. Todaro. 1970. "Migration, Unemployment and Development: A Two-Sector Analysis," *American Economic Review*, vol. 60, no. 1, pp. 126-142.

Hazari, B. R. 1978. *The Pure Theory of International Trade and Distortions*. New York: John Wiley & Sons.

Helpman, E., Melitz, M. J. and S. R. Yeaple. 2004. "Export Versus FDI with Heterogeneous Firms," *American Economic Review*, vol. 94, no. 1, pp. 300-316.

Jones, R. W. 2005. "Immigration VS Outsourcing: Effects on Labor Markets," *International Review of Economics and Finance*, vol. 14, no. 2, pp. 105-114.

Keuschnigg, C. and E. Ribi. 2009. "Outsourcing, Unemployment and Welfare Policy," *Journal of International Economics*, vol. 78, no. 1, pp. 168-176.

Kohler, W. 2004. "International Outsourcing and Factor Prices with Multistage Production," *Economic Journal*, vol. 114, no. 494, pp. c166-c185.
Long, N. V. 2005. "Outsourcing and Technology Spillovers," *International Review of Economics and Finance*, vol. 14, no. 3, pp. 297-304.
Mankiw, N. G., Romer, D. and D. N. Weil. 2004. A Contributions to the Empirics of Economic Growth. In Acemoglu, D. (ed.) *Recent Developments in Growth Theory (International Library of Critical Writings in Economics)*. vol. 1. North Hampton: Edward Elgar Publishing. pp. 163-193.
Mankiw, N. G. and P. Swagel. 2006. "The Politics and Economics of Offshore Outsourcing," *Journal of Monetary Economics*, vol. 53, no. 5, pp. 1027-1056.
McCool, T. 1982. "Wage Subsidies, Distortionary Taxes in a Mobile Capital Harris-Todaro Model," *Economica*, vol. 49, no. 193, pp. 69-79.
Neary, J. P. 1981. "On the Harris-Todaro Model with Intersectoral Capital Mobility," *Economica*, vol. 48, no. 191, pp. 219-234.
Yabuuchi, S. 2011. "Outsourcing, Income Distribution, and Unemployment," *Journal of Economic Integration*, vol. 26, no. 4, pp. 705-720.
Zhang, T. 2011. "International Outsourcing and Unemployment in a Minimum Wage Economy," *Review of International Economics*, vol. 19, no. 4, pp. 776-786.

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