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Reconsidering the effect of economic development on urban unemployment under nonhomothetic preferences

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Abstract

We reconsider the effect of economic development on urban unemployment by introducing households with nonhomothetic preferences into a sector-specific capital version of the Harris–Todaro model. Contrary to previous studies, this work shows that urban unemployment decreases with urban development but increases with rural development. As for labour growth, it normally increases urban unemployment.

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1. Introduction

Since the pioneering analysis of rural-urban migration and urban unemployment by Harris and Todaro (1970), the framework of the study has attracted a lot of attention from development economists and has been extended and applied for various purposes.[1]

One branch of these studies aims to examine the effects of economic development or expansion on urban unemployment and social welfare (e.g. Corden and Findlay 1975, Beladi and Naqvi 1988, Beladi 1990, Choi and Yu 1992, Yabuuchi 1998, and many others). Some studies, based on the Harris–Todaro model with sector-specific factors in small open economies, have revealed that rural development decreases urban unemployment, both in terms of absolute numbers and rates. However, urban development reduces the urban unemployment rate, while its effect on the number of unemployed is ambiguous. Meanwhile, labour growth in an economy increases urban unemployment (Corden and Findlay 1975, Temple 2005, and Choi and Yu 2006). Thus, rural development is seemingly an effective prescription for urban unemployment.

The above studies assume a small open economy, where the relative price is exogenously given; thus, they neglect the demand-side effects on urban unemployment.[2] However, recent studies of economic growth acknowledge the importance of the demand side in economic development. They show that households' nonhomothetic preferences cause a decline in the price of agricultural goods in accordance with income growth, which is one of the significant driving forces behind industrialization and economic development. (See Echevarria 1997, Kongsamut et al. 2001, and Matsuyama 1992, 2008.) Thus, it is becoming standard to take into account the demand side through nonhomothetic preferences in the examination of economic development using the multi-sector growth model. Therefore, there seems to be a limitation in evaluating the effect of economic development on urban unemployment, based on a model with a fixed relative price, as in previous studies.

Based on the suggestion from recent growth studies, the aim of this note is to reconsider the effect of economic development on urban unemployment with a model taking into account the change in the relative price through households' nonhomothetic preferences. To do so, we construct a sector-specific capital version of the Harris–Todaro model in a closed economy, where households with nonhomothetic preferences are introduced, and examine how urban unemployment is affected by rural development, urban development, and labour growth, through a comparative statics analysis. Following are the main findings. First, contradicting previous studies, we show that while urban development reduces urban unemployment, rural development expands it. Secondly, labour growth normally increases urban unemployment.

The rest of this note is organized as follows. Section 2 describes the model, Section 3 examines the effect of economic development on urban unemployment, and, finally, Section 4 provides conclusions and directions for future studies.

2. The Model

The economy consists of two sectors: one produces an agricultural good (Y_A) in a rural area, and the other produces a manufactured good (Y_M) in an urban area. Each sector produces the

[1] The comprehensive reviews of the studies on the Harris–Todaro model are provided by Lall et al. (2006) and Basu (1997: Ch. 8-10).

[2] There are not many studies examining the role of the demand side in the Harris–Todaro framework. One remarkable exception is Chaudhuri (2000), who incorporates the demand structure into the Harris–Todaro model, and reveals that the demand management policy is useful for the reduction of urban unemployment.

commodity using labour (L_i) and sector-specific capital ($\overline{K}_i$), where $i = A, M$. The production functions of the sectors are

$$Y_A = AF^A\left(L_A, \overline{K}_A\right) \tag{1}$$

$$\text{and } Y_M = MF^M\left(L_M, \overline{K}_M\right) \tag{2}$$

where A and M denote the technology level of each sector. Both production functions are assumed to be constant returns to scale, increasing in each factor, and concave: $F_j^i > 0$, $F_{jj}^i < 0$, and $F_{jl}^i > 0$, where F_j^i is the first derivative of F^i with respect to factor j $(= K, L)$, and F_{jl}^i is the second derivative of F^i.

In the rural area, the wage rate is flexible and labour is fully employed. We assume that the rural wage rate (w_A) is equal to the average value of the product:

$$w_A = \frac{pY_A}{L_A} = \frac{pAF^A\left(L_A, \overline{K}_A\right)}{L_A} \tag{3}$$

where p denotes the relative price of the agricultural good. (3) implies that labourers in the rural area own the sector-specific capital for agricultural production and share the income from agricultural sales equally.[3] Thus, the returns to sector-specific capital in the rural area are assumed to be null or regarded as being included in the wage. This distribution mechanism is often observed as an income-sharing mechanism in the rural areas of low-income countries.

In the urban area, on the other hand, the real wage rate is rigid, and unemployment exists. Labour allocation in the urban area is determined by marginal productivity pricing:

$$\overline{w}_M = MF_L^M\left(L_M, \overline{K}_M\right) \tag{4}$$

where $\overline{w}_M$ denotes the rigid urban wage.

All households are assumed to be identical and have nonhomothetic preferences, with the income elasticity of demand for the agricultural good being less than one. Following Matsuyama (1992), households' preferences are given by the following utility function:

$$U = (c_A - \gamma)^\alpha (c_M)^\beta, \qquad \gamma > 0, \alpha + \beta = 1$$

where c_i is the consumption level of commodity i $(= A, M)$, and γ implies the minimum quantity of the agricultural good required for subsistence. With households maximizing utility, the demand for both goods satisfies $\alpha c_M = \beta p(c_A - \gamma)$. Summing up this relation over all households yields

$$\alpha C_M = \beta p\{C_A - \gamma(L + L_K)\} \tag{5}$$

where C_i ($i = A, M$) is the aggregate consumption for each sector's good.[4] L and L_K denote the numbers of labourer and non-labourer, respectively—the latter earning only from capital

[3] This assumption is non-essential to our analysis. If we assume marginal product pricing, as in most previous studies, we still obtain almost the same propositions, but with an additional sufficient condition. In this note, the average product pricing is assumed for obtaining clearer analytical results, in the way of deriving propositions with fewer conditions.

[4] It is noted that under a Stone-Geary type of utility function, (5), (8), and (9) can completely describe the demand structure of the model without specifying the households' budget constraints. (See Matsuyama 1992.)

income in the urban area. Thus, the total number of households in the economy equals $(L + L_K)$.

A seminal feature of the Harris–Todaro model is that rural-to-urban migration occurs until the rural wage equals the expected wage in the urban area. In our model, the urban unemployed, who do not earn any income, cannot survive because $\gamma > 0$. To avoid this, we assume that the government provides an unemployment benefit such that the unemployed can purchase the exact amount of the agricultural good needed for subsistence: $p\gamma$.[5] The government finances the unemployment benefit from a capital tax levied in the urban area.[6] Therefore, the Harris–Todaro migration condition in our model is shown as

$$w_A = \overline{w}_M \frac{L_M}{L_M + L_U} + p\gamma \frac{L_U}{L_M + L_U} \tag{6}$$

where L_U denotes the number of urban unemployed, and the probability of obtaining a job in the urban area is assumed to equal $L_M/(L_M + L_U)$.

Finally, the market-clearing conditions for a production factor and commodities are as follows:

$$L_A + L_M + L_U = L \tag{7}$$

$$Y_A = C_A \tag{8}$$

$$\text{and } Y_M = C_M \tag{9}$$

3. Analysis

In this section, we examine how urban unemployment is affected by economic development, embodied by an increment in endowments or technology levels. First, we reduce the model to a system of five equations. (6) can be rearranged as

$$w_A(L_M + L_U) - \overline{w}_M L_M - p\gamma L_U = 0 \tag{10}$$

Substituting (8) and (9) into (5) yields

$$\alpha MF^M\left(L_M, \overline{K}_M\right) = \beta p\left\{AF^A\left(L_A, \overline{K}_A\right) - \gamma(L + L_K)\right\} \tag{11}$$

(3), (4), (7), (10), and (11) contain five endogenous variables (L_A, L_M, L_U, w_A, p) and five parameters related to economic development (A, $\overline{K}_A$, M, $\overline{K}_M$, L).

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[5] Unemployment benefit is a way of specifying the source of livelihood for the unemployed, and has been studied in the context of Harris–Todaro studies. For example, see Holmlund and Lundborg (1990) and Temple (2005). One technical advantage of this setting is that it makes it easy to construct a two-sector model, as in previous studies. In our study, the amount of unemployment benefits is non-essential for our analysis. As for its finances, our propositions appearing later hold as long as finances are collected in a form that does not affect the wage differential between regions ($\overline{w}_M/w_A$). Another way of considering the livelihood of the unemployed is by incorporating the informal sector, and we review the relation between our study and it in the last section.

[6] In order to precisely describe our model, we need two additional equations below:

$$(1 + \tau)r = MF_K^M(L_M, \overline{K}_M), \quad p\gamma L_U = \tau r \overline{K}_M$$

where τ denotes the tax rate. The first equation describes how the returns to sector-specific capital in the urban area (r) is determined. The other equation denotes the budget constraint for the government. However, these two equations are not substantial for our analysis.

To determine the effect of a change in each parameter on L_U , we totally differentiate these equations and obtain

$$\begin{pmatrix} pAF_L^A - w_A & 0 & 0 & -L_A & AF^A \\ 0 & MF_{LL}^M & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & w_A - \overline{w}_M & w_A - p\gamma & L_M + L_U & -\gamma L_U \\ \beta pAF_L^A & -\alpha MF_L^M & 0 & 0 & \beta\{AF^A - \gamma(L + L_K)\} \end{pmatrix} \begin{pmatrix} dL_A \\ dL_M \\ dL_U \\ dw_A \\ dp \end{pmatrix}$$

$$= \begin{pmatrix} -pF^A dA - pAF_K^A d\overline{K}_A \\ -F_L^M dM - MF_{LK}^M d\overline{K}_M \\ dL \\ 0 \\ -\beta pF^A dA - \beta pAF_K^A d\overline{K}_A + \alpha F^M dM + \alpha MF_K^M d\overline{K}_M + \beta p\gamma dL \end{pmatrix}$$

Here, we assume the following two conditions:

$$\overline{w}_M \geq w_A \geq p\gamma \text{ and } AF^A - \gamma(L + L_K) > 0$$

The first condition ensures that each sector employs a positive amount of labour. The second one implies that this economy produces a sufficient amount of the agricultural good for subsistence.[7] From these assumptions, the determinant of the coefficient matrix is proved to be positive:

$$|A| \equiv \beta MF_{LL}^M \begin{bmatrix} pAF_L^A\{\gamma L_A L_U - AF^A(L_M + L_U)\} \\ +\{AF^A - \gamma(L + L_K)\}\{(pAF_L^A - w_A)(L_M + L_U) - L_A(w_A - p\gamma)\} \end{bmatrix} > 0$$

Now, we investigate the effect of rural development on the number of unemployed. Calculating $\partial L_U/\partial A$ and $\partial L_U/\partial \overline{K}_A$ yields

$$\frac{\partial L_U}{\partial A} = \frac{1}{|A|}\beta MF_{LL}^M pF^A \gamma\{L_A L_U - (L + L_K)(L_M + L_U)\} > 0 \tag{12}$$

$$\frac{\partial L_U}{\partial \overline{K}_A} = \frac{1}{|A|}\beta MF_{LL}^M pAF_K^A \gamma\{L_A L_U - (L + L_K)(L_M + L_U)\} > 0 \tag{13}$$

Thus, the following proposition is derived.

Proposition 1
In the Harris–Todaro model with sector-specific capital under nonhomothetic preferences, urban unemployment increases with technological progress or capital accumulation in the rural area.

[7] These conditions also guarantee the existence and uniqueness of the equilibrium.

In our model, urban unemployment increases with rural development, which is therefore harmful for the economy. However, according to the previous studies introduced in Section 1, with an increase in the rural wage induced by rural development, wage differentials between regions decrease and urban unemployment reduces. This inconsistency arises from households' preferences. With rural development, the real wage in the rural area and agricultural production increase. In our model, these increases are accompanied by a huge decline in the agricultural price, since the income elasticity of demand for the agricultural good is less than one. This decline in p is larger than the increase in the real wage in the rural area, which eventually leads to a fall in the nominal wage there.[8] Therefore, rural development expands wage differentials between regions and increases urban unemployment.

To make sure that nonhomothetic preferences and the low income elasticity of demand for the agricultural good play a crucial role in deriving Proposition 1, let us consider two other cases regarding households' preferences: $\gamma = 0$ and $\gamma < 0$. Firstly, if γ is equal to 0, which implies households' preferences are homothetic, $\partial L_U/\partial A$ and $\partial L_U/\partial \overline{K}_A$ are equal to 0 from (12) and (13). It means that rural development has no effect on urban unemployment. Secondly, in the case of $\gamma < 0$, which implies an agricultural good is a luxurious good, $\partial L_U/\partial A$ and $\partial L_U/\partial \overline{K}_A$ have positive signs, and we obtain a result opposite to Proposition 1. Thus, if and only if the income elasticity of demand for the agricultural good is less than one, which is the case when $\gamma > 0$, we obtain Proposition 1.

Next, we consider the effect of urban development in terms of increments in M or $\overline{K}_M$. The effect of technological progress in the urban area is given by

$$\frac{\partial L_U}{\partial M} = \frac{1}{|A|}\frac{\alpha M F^M F_L^M L_A}{p}\left[\begin{array}{r} MF_{LL}^M L_M(1-\theta_{ML})\left(\dfrac{1}{1-\theta_{ML}} - \varepsilon_{M\overline{w}_M}\right) \\ -(w_A - pAF_L^A)\dfrac{L_M + L_U}{L_A} - w_A - \dfrac{\beta}{\alpha}pAF_L^A\theta_{ML} \end{array}\right] \tag{14}$$

where $\varepsilon_{M\overline{w}_M}$ and θ_{ML} denote the wage elasticity of labour demand and the labour share in the urban area, respectively. Thus, we obtain the following proposition.

Proposition 2
In the Harris–Todaro model with sector-specific capital under nonhomothetic preferences, urban unemployment decreases with technological progress in the urban area, if $\varepsilon_{M\overline{w}_M} \leq 1/(1-\theta_{ML})$.

Hereafter, we assume that the condition $\varepsilon_{M\overline{w}_M} \leq 1/(1-\theta_{ML})$ is satisfied. The effect of capital accumulation in the urban area is calculated as

$$\frac{\partial L_U}{\partial \overline{K}_M} = \frac{1}{|A|}\beta M F_{LK}^M\left[\begin{array}{r} pAF_L^A\gamma\{L_A L_U - (L+L_K)(L_M+L_U)\} \\ -w_A L\{AF^A - \gamma(L+L_K)\} \end{array}\right] < 0 \tag{15}$$

and the following proposition is derived.

Proposition 3
In the Harris–Todaro model with sector-specific capital under nonhomothetic preferences, urban unemployment decreases with capital accumulation in the urban area.

Propositions 2 and 3 contradict the ambiguous effects on urban unemployment in

[8] Indeed, $\partial w_A/\partial A$ and $\partial w_A/\partial \overline{K}_A$ show negative signs. All results of comparative statics are available on request.

previous studies. In our model, urban development affects unemployment through two channels: an expansion of labour demand in the urban area and an increase in the relative price. The first channel figures in previous studies as well. The expansion of labour demand in the urban area increases the probability of obtaining jobs there. This causes migration from the rural to the urban area and increases urban unemployment. Meanwhile, this migration increases the rural wage, which in turn helps decrease urban unemployment. Therefore, the net effect of an increase in labour demand on unemployment is ambiguous—hence the ambiguity in previous studies. However, the second channel, which is unique to our model, outweighs the first and removes the ambiguity. Since the supply of the manufactured product increases with urban development, the relative price of the agricultural good rises. It raises the nominal wage in the rural area and reduces wage differentials between regions.[9] This causes outward migration from the urban area, which contributes to decreasing urban unemployment. Summing up the effects working through the above two channels, we can show that urban unemployment decreases with urban development, which is therefore beneficial to the economy.[10] However, we need one sufficient condition to derive the definite effect of M.

Here, it should be noted that from (14) and (15), Proposition 2 and 3 hold regardless of the sign of γ.[11] It means that these propositions result from endogenizing the relative price, rather than from the assumption of households' preferences.

Finally, we calculate the effect of labour growth as follows:

$$\frac{\partial L_U}{\partial L} = \frac{1}{|A|}\beta M F_{LL}^M \left[\begin{array}{r}(pAF_L^A - w_A)(L_M + L_U)\{AF^A - \gamma(L + L_K)\} \\ +p(AF_L^A - \gamma)\{\gamma L_A L_U - AF^A(L_M + L_U)\}\end{array}\right] \tag{16}$$

This gives the following proposition.

Proposition 4
In the Harris–Todaro model with sector-specific capital under nonhomothetic preferences, urban unemployment increases with an economy-wide labour growth, if $AF_L^A \geq \gamma$.

If the marginal productivity of labour in the rural area is larger than γ, urban unemployment increases with labour growth. However, if the condition is violated ($AF_L^A < \gamma$), there arises the possibility of a non-intuitive result: a drop in the number of unemployed as a result of labour growth. When the marginal productivity of labour in the rural area is below γ, the additional labour there cannot produce enough of the agricultural good to sustain the new-born labour. This raises the price of the agricultural good. If this increase is sufficiently large, the nominal wage in the rural area rises, and outward migration from the urban area exceeds the additional labour supply in the whole economy. Therefore, the number of urban unemployed may decrease. We also notice that this non-intuitive effect of labour growth occurs only if the income elasticity of demand for the agricultural good is less than one: $\gamma > 0$.

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[9] $\partial w_A/\partial M$ and $\partial w_A/\partial \overline{K}_M$ are always shown to be positive.

[10] From (4), as well as Propositions 2 and 3, it is noteworthy that the urban unemployment rate also decreases as a result of urban development, as in previous studies.

[11] (15) can be rearranged as

$$\frac{\partial L_U}{\partial \overline{K}_M} = \frac{1}{|A|}\beta M F_{LK}^M [pAF_L^A \gamma L_A L_U + \gamma(L + L_K)\{pAF_L^A L_A + L(w_A - pAF_L^A)\} - w_A L AF^A]$$

and has a negative sign in the case of $\gamma \leq 0$.

4. Conclusions

By introducing households with nonhomothetic preferences into a sector-specific capital version of the Harris–Todaro model, we show that urban unemployment decreases with urban development, but increases with rural development. This finding is contrary to previous studies. We also show that through nonhomothetic preferences, the demand side has an important role in the formulation of the propositions discussed in the paper.

Finally, we refer to some limitations of our analysis and the room for further investigations. First, we only examine the case of the capital that is sector-specific, and the analysis can be extended to a mobile capital version of the Harris–Todaro model. Second, our assumption about how the urban unemployed earn their livelihoods is not universal. Though the unemployment benefit provided by government works well only in a limited number of developing countries, it is useful in constructing a two-sector model, and makes our analysis comparable with previous studies that are based on two-sector models. The alternative model-setting about their sources of livelihood is to incorporate the informal sector, such as in Fields (1975), Gupta (1993), Yabuuchi and Beladi (2001), Chaudhuri (2000), Chaudhuri et al. (2006), and so on. While this makes the model applicable to developing countries in general, another problem arises from the addition of a sector; the economic development in rural or urban areas affects the number employed and the wage rate in the informal sector, and it has an effect on urban unemployment. Therefore, the results derived from such a model depend heavily on how the informal sector has been incorporated into the model, and are incomparable with previous studies based on two-sector models. Though it is worthwhile to examine such topics, we consider it beyond the aim of this note, and that it should be examined separately.

Despite above limitations, this note shows that incorporating households with nonhomothetic preferences into the conventional Harris–Todaro model provides contradictory findings from previous studies, and suggests the importance of the demand factor in evaluating the effect of economic development on urban unemployment.

References

Basu, K. (1997) *Analytical Development Economics: The Less Developed Economy Revisited*, MIT Press: Cambridge, MA.

Beladi, H. (1990) "Sector Specific Wage Rigidity and Factor Accumulation" *Economic Record* **66**, 32-36.

Beladi, H. and N. Naqvi (1988) "Urban Unemployment and Non-immiserizing Growth" *Journal of Development Economics* **28**, 365-376.

Chaudhuri, S. (2000) "Rural-urban Migration, the Informal Sector, Urban Unemployment, and Development Policies: A Theoretical Analysis" *Review of Development Economics* **4**, 353-364.

Chaudhuri, S., S. Yabuuchi and U. Mukhopadhyay (2006) "Inflow of Foreign Capital and Trade Liberalization in a Model with an Informal Sector and Urban Unemployment" *Pacific Economic Review* **11**, 87-103.

Choi, J. Y. and E. S. H. Yu (1992) "Technical Progress, Terms of Trade and Welfare in a Mobile Capital Harris–Todaro Model" in *Economic Theory and International Trade* by W. Neuefeind and R. G. Riezman, Eds., Springer Berlin: Heidelberg, 129-142

Choi, J. Y. and E. S. H. Yu (2006) "Industrial Targeting and Non-shiftable Capital in the Harris–Todaro Model" *Review of International Economics* **14**, 910-921.

Corden, W. M. and R. Findlay (1975) "Urban Unemployment, Intersectoral Capital Mobility and Development Policy" *Economica* **42**, 59-78.

Echevarria, E. C. (1997) "Changes in Sectoral Composition Associated with Economic Growth" *International Economic Review* **38**, 431-452.

Fields, G. S. (1975) "Rural-urban Migration, Urban Unemployment and Underemployment, and Job-search Activity in LDCs" *Journal of Development Economics* **2**, 165-187.

Gupta, M. R. (1993) "Rural-urban Migration, Informal Sector and Development Policies: A Theoretical Analysis" *Journal of Development Economics* **41**, 137-151.

Harris, J. R. and M. P. Todaro (1970) "Migration, Unemployment and Development: A Two-sector Analysis" *American Economic Review* **60**, 126-142.

Holmlund, B. and P. Lundborg (1990) "Incidence Analysis of Financing Unemployment Benefits in a Partially Unionized Economy" *Economica* **57**, 371-382.

Kongsamut, P., S. Rebelo and D. Xie (2001) "Beyond Balanced Growth" *Review of Economic Studies* **68**, 869-882.

Lall, S. V., H. Selod and Z. Shalizi (2006) "Rural-urban Migration in Developing Countries: A Survey of Theoretical Predictions and Empirical Findings" Policy Research Working Paper Series, The World Bank, number 3915

Matsuyama, K. (1992) “Agricultural Productivity, Comparative Advantage, and Economic Growth” *Journal of Economic Theory* **58**, 317-334.

Matsuyama, K. (2008) “Structural Change” in *The New Palgrave Dictionary of Economics*, *2nd Edition* by S. N. Durlauf and L. E. Blume, Eds., Palgrave Macmillan. Available at http://www.dictionaryofeconomics.com/article?id=pde2008_S000440
(accessed July 4, 2014)

Temple, J. (2005) “Growth and Wage Inequality in a Dual Economy” *Bulletin of Economic Research* **57**, 145-169.

Yabuuchi, S. (1998) “Urban Unemployment, Factor Accumulation, and Welfare” *Review of Development Economics* **2**, 31-40.

Yabuuchi, S. and H. Beladi (2001) “Urban Unemployment, Informal Sector and Development Policies” *Journal of Economics* **74**, 301-314.