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Abstract

In this work we analyze the importance of dynamics in the determination of the distribution of gains from free trade and migration. Given a transition dynamic, free trade might worsen a country relatively to autarchy. Moreover, some individuals might lose welfare during the transition dynamics. In both case, individuals find incentives to migrating, given the lost in the welfare relatively to the autarchy; given the lost in welfare relatively to another country; or, given the intertemporal lost in welfare. Then, inequalities in the distribution of the benefits from free trade matters. Finally, we find out that population size and specialization in production matters in the determination of the distribution of gains from free trade and migration.

Keywords: Migration, free trade, welfare, transition dynamics.
JEL Codes: J61, C14

1 Introduction

The benefits of free trade seem undeniable. Liberal trade policies sharpen competition, motivate innovation and breed success; and protection leads to inefficient producers supplying consumers with outdated, unattractive products (WTO, 2005). Thus, liberalization seems to guarantee that all countries, including the poorest, can benefit from trade. Also, free trade seems to be the best single migration policy that could be put place (Layard et al., 1992).

Nevertheless, a more formal theoretical analysis shows that free trade might cause an individual welfare loss. The ownership of resources (Bhagwati and Brecher, 1979; Brecher and Bhagwati, 1981) or the ownership of technology (Brecher, 1982); exogenous changes in factor endowment or changes in technology (Dixit and Norman, 1980); even transfers or gifts between countries can have undesirable and unsuspected effects on the welfare of at least one country or individual (Dixit and Norman, 1980). In fact, might be advantageous for a country to protect their markets in a world formed by multilateral free trade economies (Deardorff and Stern, 2004).

Since free trade might improve or worsen welfare, this relative or absolute welfare *deprivation* might incentive to migrating. Consequently, the spreading of free trade around the world urges to define the impact of the free movements of goods on individual welfare and migration patterns. Also, analyze if free trade improves or worsens individual welfare, even in the case of welfare improvements in both countries. This is to say, individuals can observe an absolute or relative worsening of the welfare level enjoyed during the transition from autarchy to free trade.

The main aim of this paper is show the relevance of transition dynamics and price formation in the analysis of welfare in open economies. Firstly, we will jump from the autarchy to the free trade equilibrium, and show that this jump might pro-

duce an absolute worsening of the welfare enjoyed by an individual relatively to the autarchy. Second, we generate a convergent dynamics to a stable free trade equilibrium, such that both economies are better off than in autarchy; but, during the transition dynamics some individuals are worse off.

In both cases, the opening of the economies generates incentives to migrating. This assessment leads to assume that the genuine origin of migration stimuli should be found in the absolute and relative worsening in the individual welfare level. Changes in relative welfare matters, relatively to a group (Stark and Bloom, 1985), a country, or just relatively to oneself, given the intertemporal horizon. If this assumption is true, excepting very particular cases, free movement of goods causes migration in a strong sense.

But that is not the only aftermath. Under particular conditions, we find out that specialization in production strongly affects the distribution of gains across countries, and consequently, the individual welfare in absolute or relative sense. Then, specialization in production can inhibits or incentives to migrating.

2 Theoretical framework

Since individual are rational, they demand goods in domestic or international markets, at the smallest price. But, an interesting question to be answered is how individuals know if prices are really the cheapest one? In general equilibrium frameworks, the price of an unique good p_i^c depends on the vector of factor prices ω^c, that depends on the demand of this factor, that depends on the total demands of goods. Finally, the total demands of goods depends on the price p_i^c, which value is unknown.

Therefore, individuals do not know if is buying at the minimum price. This

neverending cycle implies that choosing where and how much to consume be a hard task for an individual. Each individual must decide under uncertainty about the performance of others individuals in the economy. The final result can be such that some or all individuals are better off in autarchy than in free trade.

Unfortunately or not, the above results cannot be obtained in general. In fact, is not possible say very much about the general equilibrium effects of changes in parameters without knowing the exact values of parameters and the exact characteristics of demand and supply functions (Dixit and Norman, 1980). Let assume that utility and production functions satisfy the following condition.

Condition 2.1 *Let two economies be $c = 1,2$, with N^c identical individuals with utility function $u^c(\cdot) = \prod_i x_i^{1/I}$; that produce $I > 2$ goods, given the production functions $f_i^c(z) = \frac{z}{a_i^c}$, and $a_i^c > 0$ a constant. Each country has $\overline{z}^c = N^c$ units of the production factor, equally distributed over the whole population.*

Under condition 2.1, the maximizing utility demands are $x_i^c = \frac{\omega^c z^c}{I p_i^c}$. Given $p_i^c = \omega^c a_i^c$, the minimizing cost price, under full employment the utility level that each country enjoys in autarchy is

$$u^{c,aut} = \prod_i \left(\frac{\overline{z}^c}{I a_i^c} \right)^{1/I}; \tag{1}$$

and each individual enjoys a welfare level equal to $u_n^{c,aut} = \prod_i (\frac{1}{I a_i^c})^{1/I}$. Notice that, in autarchy, the welfare level enjoyed by individuals depends exclusively on a_i^c. This property will help to analyze the properties of the free trade solution. Let impose an additional condition.

Condition 2.2 *Given the production functions $f_i^c(z) = \frac{z}{a_i^c}$, the coefficients a_i^c satisfy the following relationship $a_i^1 = a_{I-i+1}^2$.*

Condition 2.2 means that the utility level enjoyed by the individuals are $u_n^{1,aut} = u_n^{2,aut}$ and do not exist incentives to migrating in autarchy. However, since $a_i^1 \neq a_i^2$ and $I > 2$, at least one countries will be better off in open economy than in autarchy.

2.1 Jumping from autarchy to free trade

Let considers that Country 1 have comparative advantage in the production of ℓ goods, and Country 2 in the production of κ, and $\ell + \kappa = I$. Let considers that consumers simultaneously demand goods where the observed prices $p_i^{c,obs}$ satisfy $p_i^{obs} = min\{p_i^{1,obs}, p_i^{2,obs}\}$.

Given total consumer demands, producers will demand the quantity of factor needed to produce these quantities. Under full employment, we show that the equilibrium wage satisfies the following relationship:

$$\frac{\omega^{1,ab}}{\omega^{2,ab}} = \frac{\ell \bar{z}^2}{\kappa \bar{z}^1}. \tag{2}$$

At these prices, the welfare level enjoyed by each country depends on the endowments of factors z^c; on ℓ, κ, the number of the exported–imported goods; and on the a_i^c coefficients.

$$u^{1,ab}(\cdot) = \prod_{i=1}^{\ell} \left(\frac{\bar{z}^1}{I a_i^1} \right)^{1/I} \prod_{i=\ell+1}^{I} \left(\frac{\ell \bar{z}^2}{\kappa I a_i^2} \right)^{1/I} \tag{3}$$

$$u^{2,ab}(\cdot) = \prod_{i=1}^{\ell} \left(\frac{\kappa \bar{z}^1}{\ell I a_i^1} \right)^{1/I} \prod_{i=\ell+1}^{I} \left(\frac{\bar{z}^2}{I a_i^2} \right)^{1/I} \tag{4}$$

From the previous equations we obtain that the relative welfare between countries depends exclusively on the quotient between exported/imported goods. Also, the welfare level enjoyed by an individual n in Country 1, relatively to those that

could be enjoyed in Country 2, is equal to the international relative price of production factor:

$$\frac{u^{1,ab}(\cdot)}{u^{2,ab}(\cdot)} = \left(\frac{\ell}{\kappa}\right) \quad \Rightarrow \quad \frac{u_n^{1,ab}(\cdot)}{u_n^{2,ab}(\cdot)} = \frac{\omega^{1,ab}}{\omega^{2,ab}} = \left(\frac{\ell\bar{z}^2}{\kappa\bar{z}^1}\right). \tag{5}$$

Notice that in autarchy individuals enjoy from the same absolute and relative welfare level —see equation (1). Then, free trade produced, at least, relative differences in welfare among countries. Also, these differences do not depends only on the relative abundance of factors, but rather on the relative diversity of the productive sector of a country ℓ, κ. Then, specialization can have strong consequences over the welfare, favoring the most competitive country and worsening the less competitive country.

Therefore, if individuals respond to relative international differences in the welfare level enjoyed, opening markets incentives to migrating, even if the welfare level improves in both countries. But, we can ask if is true that the welfare level has improved in absolute terms in both countries? Comparing the utility enjoyed in autarchy with that one in open economy, we find that welfare improves in both countries only if it satisfies that:

$$\prod_{i=\ell+1}^{I}\left(\frac{a_i^2}{a_i^1}\right)^{1/\kappa} < \left(\frac{\ell\bar{z}^2}{\kappa\bar{z}^1}\right) < \prod_{i=1}^{\ell}\left(\frac{a_i^2}{a_i^1}\right)^{1/\ell}. \tag{6}$$

Proof 2.1 *Free trade improves welfare in both countries if* $u^{c,ab} > u^{c,aut}$. *From equations (1), (3) and (4) is easy to find that* $u^{1,ab} > u^{1,aut} \Rightarrow \left(\frac{\ell\bar{z}^2}{\kappa\bar{z}^1}\right) > \prod_{i=\ell+1}^{I}\left(\frac{a_i^2}{a_i^1}\right)^{1/\kappa}$ *and* $u^{2,ab} > u^{2,aut} \Rightarrow \left(\frac{\ell\bar{z}^2}{\kappa\bar{z}^1}\right) < \prod_{i=1}^{\ell}\left(\frac{a_i^2}{a_i^1}\right)^{1/\ell}$ ■

In general, the above inequality is not satisfied for arbitrary values of parameters. Consequently, free trade can worsen a country relatively to another country,

and individuals residing in the country that has worsened in absolute terms, have incentives to migrating, in order to improve absolute their welfare level.

Notice that, the results depends on dynamics. Countries jump from the autarchy to the open economy and, given the fact that consumers only observe the prices in autarchy $p_i^{c,aut} = a_i^c \omega^{c,aut}$, they cannot know the prices in open economy $p_i^{c,ab} = a_i^c \omega^{c,ab}$. Thus, consumers must choose *how much* and *from where* to consume, given the "unobserved free trade equilibrium prices". In fact, with this dynamics, the behavior of individuals is consistent with perfect rationality.

2.2 The convergence to free trade equilibrium

The purpose of this section is analyze the properties of the convergence to the free trade equilibrium, under specific assumptions about dynamics. Let consider that in each instant t a new consumer finds out cheaper buy some goods abroad. Then, there are t individuals in t formulating their demands abroad, given the observed prices $p_{it}^{c,obs} = a_i^c \omega_{t-1}^c$. Given these demands, producers plan the production and offer goods at $p_{it}^c = a_i^c \omega_t^c$, maybe different from $p_{it}^{c,obs}$. At $t = T$, there T consumers demanding goods at $p_{iT} = min\{p_{iT}^1, p_{iT}^2\}$ from abroad, and $N^c - T > 0$ individuals consuming in domestic markets at p_{iT}^c.

The welfare of individuals can be obtained observing that in each country there are two groups: the *importing goods consumers* and the *domestic goods consumers*. The utility level reached by the $N^c - t$ importing goods individuals is:

$$u_{(n,d)t}^{c,ab}(\cdot) = \prod_{i=1}^{I} \left(\frac{\omega_{t-1}^c}{I a_i^c \omega_t^c} \right). \tag{7}$$

And the utility level reached by the domestic goods consumers at t is:

$$u^{1,ab}_{(n,m)t}(\cdot) = \prod_{i=1}^{\ell}\left(\frac{\omega^1_{t-1}}{Ia^1_i\omega^1_t}\right)\prod_{i=\ell+1}^{I}\left(\frac{\omega^1_{t-1}}{Ia^2_i\omega^2_t}\right) \tag{8}$$

$$u^{2,ab}_{(n,m)t}(\cdot) = \prod_{i=1}^{\ell}\left(\frac{\omega^2_{t-1}}{Ia^1_i\omega^1_t}\right)\prod_{i=1+\ell}^{I}\left(\frac{\omega^2_{t-1}}{Ia^2_i\omega^2_t}\right) \tag{9}$$

Let show how equilibrium prices in each instant t is formed. If producers try to satisfy the total demand of consumers, the total demand of factors in Country 1 is:

$$z^1_t = \ell\left(\frac{\omega^1_{t-1}}{I\omega^1_t}N^1 + \frac{\omega^2_{t-1}}{I\omega^1_t}t\right) + \kappa\left(\frac{\omega^1_{t-1}}{I\omega^1_t}(N^1 - t)\right), \tag{10}$$

if $a^1_i\omega^1_t < a^2_i\omega^2_t$ for $1,\ldots,\ell$ goods. And the total demand of factors in Country 2 is:

$$z^2_t = \kappa\left(\frac{\omega^2_{t-1}}{I\omega^2_t}N^2 + \frac{\omega^1_{t-1}}{I\omega^2_{it}}t\right) + \ell\left(\frac{\omega^2_{t-1}}{I\omega^2_t}(N^2 - t)\right), \tag{11}$$

if $a^1_i\omega^1_t > a^2_i\omega^2_t$ for $\ell+1,\ldots,I$ goods.

Under the full employment $z^c = \overline{z^c} = N^c$, substituting N^c and manipulating equations (10) and (11), we find that the equilibrium wage satisfies:

$$\omega^{c,ab}_t = \omega^c_{t-1} + (-1)^c t\left(\kappa\frac{\omega^1_{t-1}}{IN^c} - \ell\frac{\omega^2_{t-1}}{IN^c}\right). \tag{12}$$

For sake of simplicity, let considers that in autarchy factor prices satisfies the relation $\kappa\omega^{1,aut} = \ell\omega^{2,aut} \Rightarrow \omega^{c,ab}_t = \omega^{c,ab}_{t+1}$ for any $t \leq min\{N^1, N^2\}$. At these prices, individuals acquiring goods from abroad improve their welfare level, since relative wages remains constant and the prices of imported goods are lowering.

However, if $N^1 \neq N^2$ and $N^1 > N^2$, at $t = N^2$, all individuals residing in Country 2 have already acquired the desired quantities of goods from abroad; but there are $N^1 - N^2$ individuals residing in Country 1 buying goods in domestic markets,

despite is cheaper buy in Country 2. Then, individuals residing in Country 1 can improve their welfare if they buy goods from abroad. From equations (10) and (11), we find for $t > N^2$ that the full employment wage is:

$$\omega_t^c = \begin{cases} \omega_{t-1}^{1,ab} + \ell \frac{N^2 \omega_{t-1}^{2,ab}}{IN^1} - \kappa \frac{\omega_{t-1}^{1,ab}}{IN^1} t, & \text{if } c = 1; \\ \kappa \frac{\omega_{t-1}^{2,ab}}{I} + \kappa \frac{\omega_{t-1}^{1,ab}}{IN^2} t, & \text{if } c = 2. \end{cases} \tag{13}$$

Then, $\omega_t^{1,ab}$ is diminishing relatively to $\omega_t^{2,ab}$ for everything $t > N^2$. Consequently, prices of imported goods increases in Country 1, since $\omega_t^{2,ab} > \omega_{t-1}^{2,ab}$, and the welfare of those individuals importing goods from abroad and residing in the Country 1 diminish.

Moreover, since wages in Country 1 is decreasing, and wages in Country 2 is rising, Country 1 might wins comparative advantage in the production of some other goods. In particular, if N^1 is large enough to guarantee that $a_q^1 \omega_{T_n}^{1,ab} \leq a_q^2 \omega_{T_n}^{2,ab}$ for some $T_n \leq N^1$. If it occurs, wages in Country 1 will continue to diminish and wages in Country 2 will continue to increase. In this process, the welfare of some individuals in Country 1 will diminish, given the welfare enjoyed in the previous period.

3 Conclusions

The results obtained are a direct consequence of considering that individuals play the double role of consumer and factors supply. Also, the transition dynamics from autarchy to free trade equilibrium matters. Jumps from autarchy to free trade can reduce the welfare in absolute and relative terms. Using more complex dynamics, individuals can improve their welfare relatively to those enjoyed in autarchy, but not relatively to those enjoyed in the previous periods.

At this point, the relevant question is (in a world that spreads the free trade): in what extent the unequal distribution of benefits proceeding from free trade affects the welfare of individuals, and, consequently the migratory patterns? Also, we should ponder about the stimuli of migrants: absolute reductions between equilibria; absolute reductions during the transition between equilibria; or relative changes in the level of welfare enjoyed.

The hypotheses relatively to the causes of the migration should to be analyzed more carefully. In this section we find out that some or all individuals can be worse off in open economy than in autarchy, at least during the transition to the equilibrium. In such a case, individuals can desire to emigrate to recover at least the welfare enjoyed before the opening of the economy. Consequently, the liberalization of an economy can produce two migratory flows, with different motivations: a flow caused by intertemporal or between countries comparisons in the welfare level enjoyed; and a flow caused by absolute losses in the welfare enjoyed. Moreover, we find out that the welfare level enjoyed by an individual (comparatively with the level of welfare enjoyed during the autarchy), depends on the degree of diversity of production of country, or, on the relationship between goods exported and goods imported; and on the size of populations N^c.

This result does not deny the benefits of free trade, but rather it questions the allocation of this benefit. The results of this paper point out that, therefore, the causes of the migration and free trade, cannot be analyzed exclusively in terms of flows of factors. The impact of liberalization over individuals (or migratory worker) and over economies, depends on preferences, technology and factor endowments and/or population size. Although we have included a only one production factor in the models, the results obtained should open the discussion on the impact of the liberalization of the international markets in the poorest countries —more densely

towns and smaller diversity of the productive sector—, and on migration.

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