A Decomposition of Ricardian Trade Gains

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Abstract

Teaching trade patterns and trade gains under the Ricardian trade model is one of the most difficult tasks for teachers of international economics. We propose that the utilization of both the PPF and a labor market graph makes the understanding of Ricardian trade gains much easier.
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1 Introduction

Teaching trade patterns and trade gains by using "Ricardian trade model" is one of the most important but difficult tasks for teachers of International Economics at the Principles level.[1] In most textbooks on international economics, the analysis of Ricardian trade gains relies solely on the utilization of Production Possibility Frontier (PPF) diagrams.[2]

In this note, we propose the use of a combination of the PPF graph and a labor market graph to facilitate the understanding of Ricardian trade gains. In addition, the inclusion of labor market graphs in the Ricardian Model lecture lays a useful groundwork for later lectures which deal with the Specific-Factors Model and International Factor Movements.

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[1] See Krugman (1993) on this point.
[2] See Appleyard, Field, and Cobb (2006), Caves, Frankel, and Jones (2002, ch. 5), and Krugman and Obstfeld (2008, ch. 3), for example.

2 Analysis

Consider a Ricardian economy which produces two goods (good 1 and good 2) with one factor of production, labor. Denote by a_{Li} the amount of labor needed to produce one unit of good i, and by y_i the output level of good i, respectively. Then the PPF is represented by

$$a_{L1}y_1 + a_{L2}y_2 = L, \tag{1}$$

where L is the total amount of labor. Figure 1 (a) depicts a linear PPF, VP, and the autarky equilibrium at A.

In autarky, the relative price of good 1 is determined by its opportunity cost:

$$\left(\frac{p_1}{p_2}\right)^A = \frac{a_{L1}}{a_{L2}}, \tag{2}$$

where superscript A represents the autarky equilibrium. Since prices are equal to labor costs, eq. (2) implies the equalization of wage rates between sectors.

$$\frac{p_1^A}{a_{L1}} = \frac{p_2^A}{a_{L2}}.$$

Now let us add one more panel for a better understanding: Figure 1 (b) depicts labor allocation between sectors. The horizontal axis represents the total labor force, L. The quantity of worker employed in sector 1 (resp. sector 2) sector is measured from the left (resp. right). The left (resp. right) vertical axis shows the wage rate in the sector 1 (resp. sector 2). Initially, in the autarky equilibrium, wage rates are equalized between sectors and O_1L workers are hired in sector 1, while LO_2 workers are hired in sector 2. The total income (in terms of the numeraire, good 2) is shown by the shaded rectangle.

Now let us move to the trading situation with a fixed terms of trade (Figure 2). If the terms of trade are given by the slope of the line PD, the economy specializes in good 1 at point P. Assume that consumption occurs at point C located on the consumption possibility frontier PD, so that CBP is the trade triangle (the country exports BP units of good 1 and imports BC units of good 2).

Now we can decompose the movement toward the trading equilibrium into two steps, which is in line with the traditional separation of trade gains into consumption and production gains.[3] Firstly, suppose that in the short run, labor allocation is fixed, and thus the economy is staying at the autarky production point, A, while it is able to trade at the terms of trade $p^T \equiv (p_1/p_2)^T$. Superscript T denotes the trading equilibrium. Then, the consumption possibility frontier expands from VAP to $V'AP$ as in Figure 2 (a). In Figure 2 (b), this change can be illustrated as an increase in the wage rate for the workers employed in sector 1 (i.e., from p_1^A/a_{L1} to p_1^T/a_{L1}). Their total increase in wage

[3] See, for example, Dixit and Norman (1980, pp. 71–72) and Maneschi (1998a, 1998b).

income is shown by the dotted rectangle in Panel (b), which is shown as VV' in Panel (a).

Next, let us consider the (long-run) labor movement between sectors. Since sector 1 offers the higher wage rate, workers will gradually move from the sector 2 to sector 1 (shown by the arrows in Figure 2). In Panel (b), the eventual distribution of labor force will be one with O_1O_2 workers in sector 1, which corresponds to the production point P in Panel (a). The effect of this labor movement among sectors is shown as the expansion of the consumption possibility frontier from $V'AP$ to DP in Panel (a), reflected by the horizontally shaded area in Panel (b). In terms of the numeraire, trade gains are measured by VD in Panel (a), and the sum of the dotted rectangle and the horizontally shaded rectangle in Panel (b).

3 Discussion

We believe that using the above illustration confers two major advantages. First, since the labor-market diagram emphasizes differences in wage rates between sectors in the short run, it is easier for students to understand the process of factor movements from the workers' perspectives. Furthermore, it is intuitive to see at first the trade gains in terms of labor income. This is later reinforced by the traditional separation of trade gains into consumption and production gains.

The second advantage relates to the sequencing of lectures of a typical course of International Economics (or International Trade). Since both the specific-factor model and the analysis of international factor movements make extensive use of the graphs of labor-market (dis)equilibrium, it might be helpful to provide a graph of the labor market in advance. The inclusion of labor market graphs in the Ricardian Model lecture lays a useful groundwork for the later lectures.

We recognize that there are many alternative ways to teach Ricardian trade gains and that what works well for one teacher and his/her students may not be attractive to others. Still, we believe that the way presented here provides some helpful tool for teaching Ricardian trade models.

References

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Figure 1

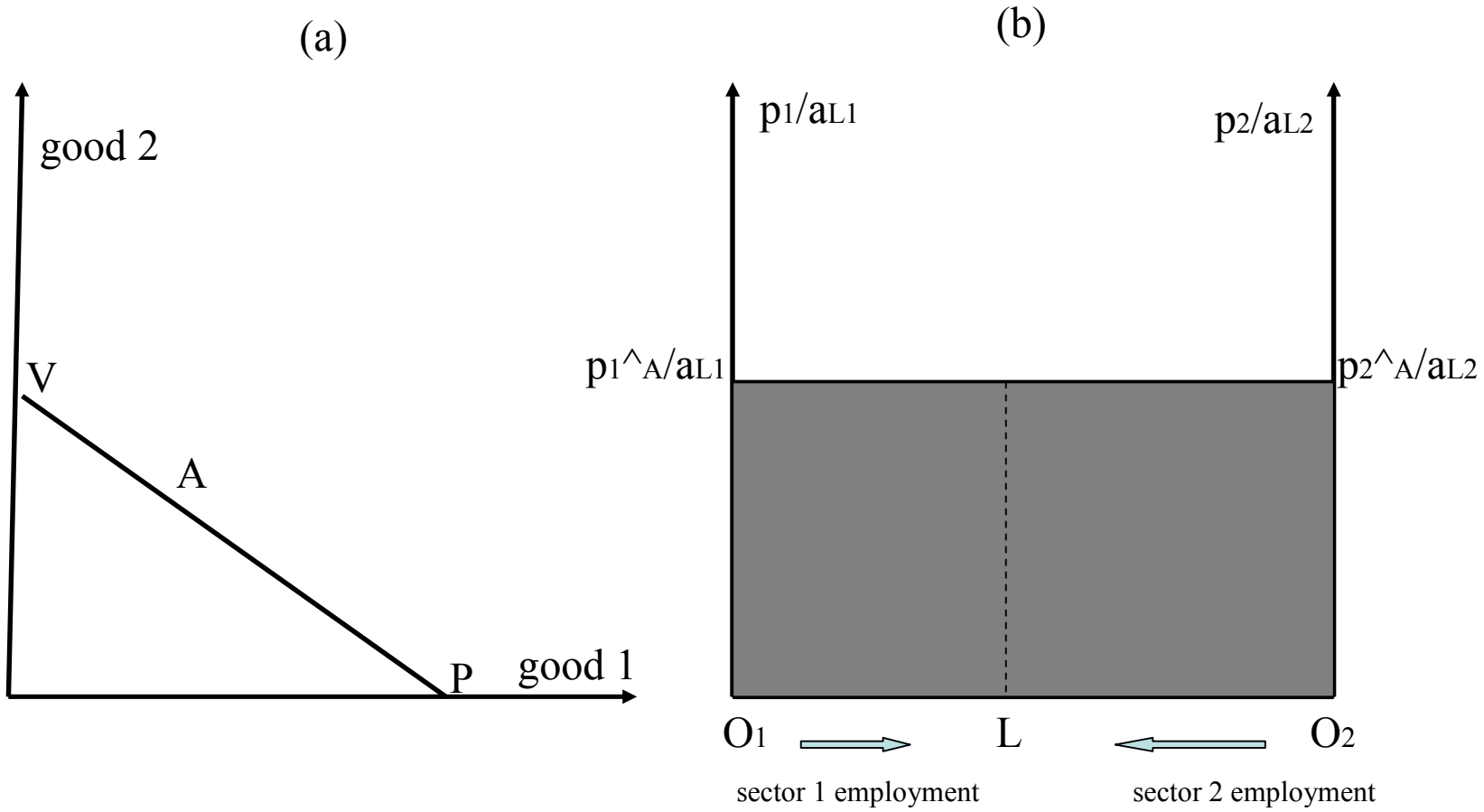
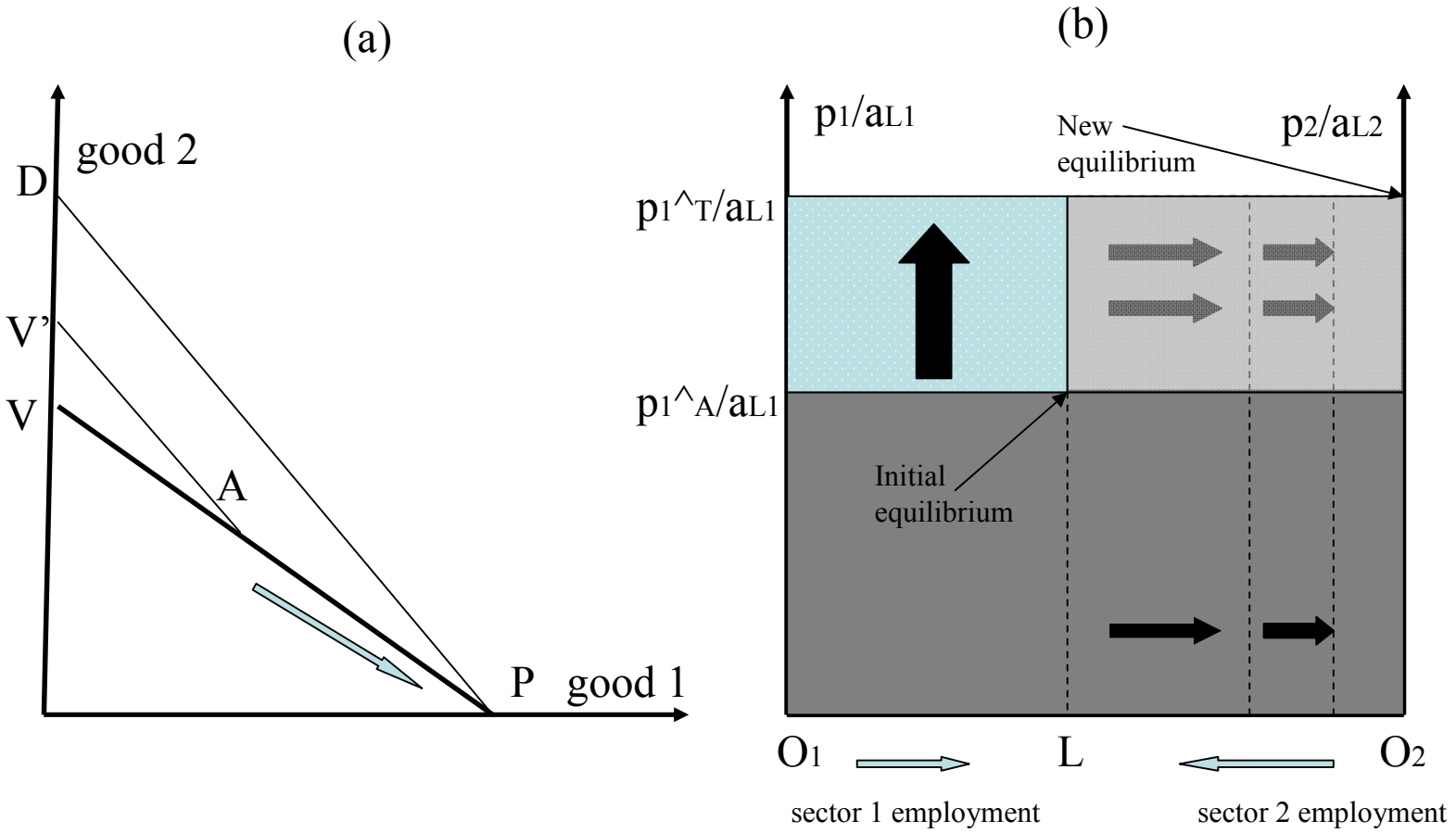

(a)
good 2
V
A
P
good 1
(b)
p1/aL1
p2/aL2
p1^A/aL1
p2^A/aL2
O1
L
O2
sector 1 employment
sector 2 employment

Figure 2


(a)
good 2
D
V'
V
A
P
good 1
(b)
p1/aL1
New
equilibrium
p2/aL2
p1^T/aL1
p1^A/aL1
Initial
equilibrium
O1
L
O2
sector 1 employment
sector 2 employment