Lab 7: Transformation Problem
GECO 6205: Advanced Political Economics 2 (Lab)

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The Problem

Marx deals with the relationship between prices and values differently in Volumes 1 and 3 of Capital.

In Volume 1, he argues that *exchange values* of commodities are given by the direct and indirect labor values in production.

In Volume 3, he derives from these "direct prices" prices at which the profit rate is equalized between industries.

Critics, such as Böhm-Bawerk and (ironically) Samuelson point out that he did not amend the money costs of input goods (labor and capital) correspondingly, and if one does, the profit rates again diverge.

Sympathizers, such as Borotkiewics and Seton, find prices which uphold proportionality between the sum of values and the sum of prices, but sever prinicipally the value-price relationship.

The essential claim is **impossibility** of a transformation from values into prices.

Relative Prices clearly fluctuate. The fluctuations are given by supply and demand.

Neoclassical (and some pre-Classical) economics assert that supply and demand imply a stable equilibrium, unsettled ("perturbated") only by technological change.

Classical and Marxist economics on the other hand argue that supply and demand provide the disorder of prices, while the order is given by a **gravitational center**.

Ricardo argues that this center is given by **natural prices**, i.e. vertically integrated labor time.

Let p be unit prices, u unit labor cost, π profits per unit output and m material costs.
Smith:

$$
\begin{aligned}
p &= u + \pi + m \\
&= u + \pi + u^{(1)} + \pi^{(1)} + m^{(1)} \\
&= u + \pi + u^{(1)} + \pi^{(1)} + u^{(2)} + \pi^{(2)} + ...
\end{aligned}
\tag{1}
$$

Prices are equal to vertically integrated labor costs and profits.

$$
p = v + \pi^T = v(1 + \rho)
\tag{2}
$$

$$
\rho = \frac{\pi^T}{v} \quad \text{the average direct and indirect profit-wage ratio}
$$

$$\frac{p_i}{p_j} = \frac{v_i}{v_j} \frac{1 + \rho_i}{1 + \rho_j} \tag{3}$$

Ricardo asserts that the second fraction will have a small impact on relative prices for two reasons.

(1) the form of $(1+x)/(1+y)$ implies that even for large deviations in the vertically integrated profit-labor ratios, the difference will be relatively small. For example: $\rho_i = 2 * \rho_j = 0.4 \Rightarrow (1 + \rho_i)/(1 + \rho_j) = 1.4/1.2 = 1.16$

(2) Due to the vertical integration, and the increasing interwinedness of capitalist production, the deviations will not be large.

Ricardo asserts that the vertically integrated profit-wage ratios will account for about 7 % of relative price fluctuations. Modern investigations seem to support that numerical claim (which is astounding).

For Marx, Ricardo's primitive labor theory of value was an important contribution to political economics.

However, neither Ricardo nor Smith answer where profits come from, because they deal (almost) only with exchange.

The source of profits is the missing link in explaining the relationship between production and exchange, and thus, between values and prices.

Accompanied by Mr. Moneybags and by the possessor of labour-power, we therefore take leave for a time of this noisy sphere, where everything takes place on the surface and in view of all men, and follow them both into the hidden abode of production, on whose threshold there stares us in the face "No admittance except on business." Here we shall see, not only how capital produces, but how capital is produced. We shall at last force the secret of profit making. (cf. Marx 1990 [1867], p279)

Principal Marxist Method: Methods of Production and Surplus Extraction form the **hidden basis of the entire social structure**.

In capitalism, production is carried out for exchange, but exchange can only be understood via production.

Marx distinguishes two kinds of value:

▶ use value: *qualitative* usefulness of a good.
▶ exchange value: the *quantitative* amount of other goods that will be exchanged for a good.

Commodities - Money - Commodities (C-M-C): Selling commodities in order to buy other commodities. Is necessary as soon as one cannot sustain themselves by their own production or transfers from others.

Money - Commodities - More Money: Buying commodities in order to sell commodities. The principle of capital accumulation.

In order to buy and sell, the Value of commodities need to be transformed into prices, i.e. the exchange value in terms of a money commodity. Exchange robs the good of its concreteness.

Equivalently, exchange abstracts from the concrete labor spent in production.

Since production dominates exchange, the labor spent in production remains decisive in the form of abstract labor.

In Marx, abstract value corresponds to the average socially necessary labor time.

Labor is sold in the C-M-C circuit and has a price: The price of the consumption bundle necessary to sustain the worker and the next generation of workers.

Exchange is necessary to realize the value of a commodity, there is no value without exchange.

However, exchange does not change the value of a commodity. Compare two producers bargaining over the relative prices of their goods versus two producers having a third person do the bargaining. In the latter case, the wage of the bargainer needs to come out of the sum of profits (aggregate profits).

Prices Matter: Market Prices fluctuate around some centers of gravity. The fluctuations are given by supply and demand, but the center of gravity is given by the share of necessary labor time. (Ricardo)

Profits are given by $\Delta M = M' - M$.

ΔM must be matched by an increase in commodities (on the social scale), otherwise it is not profits but inflation.

The total Value of a finished product is partially given by the wear and tear of fixed, and the depletion of circulating constant capital, as they are socially necessary Values just like labor.

The Value of Labor Power, the capacity to apply labor, is given by the labor necessary to produce the commodity bundle which re-produces the laborer.

While the value of the input goods C is given by $K + V$, the value of the product is $K + L$. The difference in value is thus $\Delta M = L - V$.

Assume an economy produces three commodities: capital goods A, worker consumption goods B and capitalist consumption goods C.

The prices of A and B determine the prices of the input commodities, fixed capital and reproduction of the workers.

Direct Prices: Money values of commodities proportional to labor values, e.g. 1 \$ corresponds to $1/2$ hour of work.

Direct prices are an important tool for Marx to show that no basic category of production or exchange are due to the deviation of prices from values.

Define the money profit rate $r = \frac{M'-M}{M}$ and the value profit rate $\rho = \frac{S}{K+V}$.

When commodities are exchanged at direct prices, $\rho_i = r_i \forall$ industries i.

Do some algebra with ρ: $\rho = \frac{S/V}{(K+V)/V}$: The ratio of the surplus value rate and the organic composition of capitals.

Assume uniform wages $\Rightarrow$ the surplus value rate will be the same for all industries.

However, in general, the organic composition of capital will not be the same for all industries $\Rightarrow$ value profit rates will diverge.

Transformation Problem: Find a set of prices which correspond to values (i.e. to **production**) at an equalized general profit rate.

$\rho = \frac{S/V}{(K+V)/V}$ will be smaller for larger organic compositions of capital because **surplus comes from surplus labor**.

So for a general profit rate to hold, $r_i > \rho_i$ for $[\frac{K+V}{V}]_i > [\frac{K+V}{V}]_j$ and vice versa.

The necessity for price-value deviations is general as long as the composition of $M' - M$ is not the same as in M.

The composition will always be different when there is a Sraffian Luxus good, which does not enter production (capitalist consumption good).

Then, every change in relative prices will change the general profit rate.

For each industry:

(1) Denote simultaneously the value and the price side of production.
(2) Calculate for each industry the value profit rate $\rho = S/(K + V)$.
(3) Calculate direct prices such that $M' = (1 + \rho)(M)$ where $M = (MK + MV)$.
(4) Calculate the money profit rate $r = (M' - M)/(M)[= \rho]$.

Marx' Transformation:

(5) Calculate the social rate of profit $\bar{r} = \sum(M' - M)/M$.
(6) Set transformed money prices for each industry such that $M_i' = (1 + \bar{r})M_i$.

Böhm-Bawerk's critique: Now if you transform in the same way the prices of input goods, industrial profit rates differ again!

Borotkiewicz' solution: there always exists a price vector for both inputs and outputs such that either the sum of profits or the sum of prices remains constant (but in general not both).

Marx' Transformation Procedure Extended

Shaikh's Solution: Apply an iterative procedure, i.e. alternate between Marx and Böhm Bawerk transformations.

(1.1) Calculate industrial Value profit rates and money profit rates

(2.1) Marx' Transformation: Derive the general Value profit rate, change money prices M_A, M_B, M_C such that the general rate of profits hold. Keep in mind: Industry A produces capital goods, Industry B produces workers' consumption goods!

(2.2) Calculate a price multiplicator $\psi_A = M_A'^2 / M_A'^1$ where $M_A'^1$ is money prices in step 1, etc.

(3.1) Transform input prices $MK_i'^3 = MK_i'^2 * \psi_A^2$ and $MV_i'^3 = MV_i'^2 * \psi_B^2$.

(3.2) Calculate the general profit rate for the whole economy

(4.1) Change money prices such that a uniform rate of profit from 3.2 holds

(4.2) Re-Iterate

After only 4 iterations with some general values from Shaikh (1979), money profit rates only diverge by .09 percentage points or money prices diverge by .005 percent.

Conclusion: The labor theory of values **can hold** in a theoretical model.

However, does it explain the reality of production and exchange?

The analysis of input-output matrices suggests that relative prices deviate about 5 % - 7 % from vertical labor unit costs.

Graphical analysis shows that prices and vertically integrated labor unit costs have a quasi-linear relationship.

Regression analysis shows a large correlation between prices of production and market prices (Fröhlich 2010)