

**Income Distribution and Industrial Policy:
An Assessment of the Implications of Political
Status Options on Industrial Profitability**

*Jaime L. del Valle Caballero**

Introduction

The prospect of a change in the political status of Puerto Rico has kept busy almost every sector of society, each one trying to analyze the implications of such political transformation on various orders of life in Puerto Rico. For our part, economists have focused primarily on issues identified with section 936, personal taxes, transfer payments, as well as industrial policy, output, employment and migration among others.

It is the purpose of this paper to assess the impact of the possible changes in the way income is socially distributed on industrial profitability, based on the technical conditions of production and the distributive variables. What we will do is to establish a relationship, based on the technological structure of the different industries, between profitability of the different industries and the value added generated by them. Central to our analysis is the argument that the relative success or failure of *any* industrial policy can be measured in terms of the profitability it represents for the different sectors of the economy. Status considerations will be dealt with insofar as they affect, in different ways, the social distribution of income, and with this industrial profitability.

We will use the recent developments in capital accounting based on the notions of production prices, wage shares and profit rates. With this framework we should be able to direct the income distribution-oriented policy of the different status options towards specific sectors that are more capable of generating what we could call “social income”, while compromising the least their profitability. By social income we mean the value of the net output that is distributed to all sectors of society *once profits have been paid*. This is the equivalent of a two sector analysis in which society is divided in two “classes”: workers and capitalists; with the main difference that we are not restricting all non-profit income to go directly to wages. Nevertheless we deem appropriate to analyse income distribution in terms of profits and social income, because it provides a direct link to any consideration about the profitability of the different industries.

Moreover, we should make clear that our analysis assumes that, although it is possible that the various industries change their level of output as a result of status options (Meléndez & Ruiz: 1993), they do not change their *technique of production*. In this way we can isolate changes in the functional distribution of income from changes in the technical methods of production.

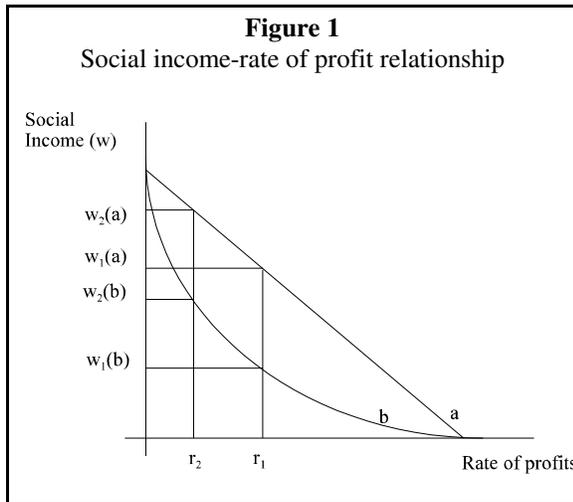
Finally we should state at this early stage that our measure of profitability is based on what we could term the “base line” profit rate. That is, profits that are enough to reproduce the initial conditions of production in a steady state situation, independent of the specific institutional arrangements that are present in each sector. The measures that we put forward are not intended to corroborate the ones obtained by the accounting practices of balance sheet analyses. Note, however, that these rates still allow us to reproduce the *actual* vector of value added.

Methodology

We begin by considering the basic input-output accounting expression $\mathbf{v} = \mathbf{p}(\mathbf{I} - \mathbf{A}) = \mathbf{a}\mathbf{w} + \mathbf{p}\mathbf{r}\mathbf{A}$ where \mathbf{v} , \mathbf{p} , \mathbf{I} and \mathbf{A} are the vectors of value added, production prices (Sraffa: 1960) and the identity and technical coefficients matrix respectively, for the 93 sectors of the 1982 input output matrix of the Puerto Rican economy. From the right hand side of this equation we can solve for the vector of prices of production $\mathbf{p} = \mathbf{a}(\mathbf{I} - (\mathbf{1} + \mathbf{r})\mathbf{A})^{-1} \mathbf{w}$. Choosing any commodity as *numéraire* we can obtain a functional relationship between the wage rate (social income) and the rate of profits in term of that sector’s value of production as $\mathbf{w}^i = \frac{1}{\mathbf{a}(\mathbf{I} - (\mathbf{1} + \mathbf{r})\mathbf{A})^{-1} \mathbf{e}_1}$, where \mathbf{e}_1 is an

i-th unit vector. (See Figure 1)(Marzi & Vari: 1977; Petrovic: 1991)

From Figure 1 we can see that if we have two industries that produce the same output, but one is more labour intensive (industry a) than the other, which is more capital intensive (industry b), then we can see that a reduction in the rate of profits from r_1 to r_2 , for



example, implies a bigger increase in social income from industry **b** (from $w_1(b)$ to $w_2(b)$) as compared to industry **a** (which changes from $w_1(a)$ to $w_2(a)$). This is what we did industry on an by industry basis.

Given that this last result is specific to the sector used as numéraire, we repeated this procedure for the 93 sectors taking each sector as numéraire. Once we had the 93 wage profit relationships, with the actual (r,w) data we ran a regression¹ to use the estimated coefficients in our simulation of the impact of an industrial policy which would transfer income from profits to “society” on the profitability of the particular industry. To be able to establish the actual distribution of income we noted that $r = \frac{P}{K} = \frac{P}{Y} \cdot \frac{Y}{K}$. In this way we can approximate the “actual” rate of profits by taking, from the vector of value added, the profit share $\left(\frac{P}{Y}\right)$, while the output-capital ratio $\left(\frac{Y}{K}\right)$ can be

1. See the Appendix in del Valle (1993) for the 93 social income-rate of profit graphs, and for the regression results. For the regressions we ran first simple regressions in the form $w=a+br$. In case the R^2 were less than 0.90, we made a new regression, but in a quadratic form $w=a+br+cr^2$. Finally for those results with an adjusted R^2 still less than 0.90 we ran a new regression in the cubic format. After those regressions no function was found with an adjusted R^2 less than 0.90.

directly obtained, without any recourse whatsoever on any index measure, from this same system of equations as the maximum rate of profit (Pasinetti: 1977; Sraffa: 1960). Moreover this disaggregation of the profit rate, viewed as the product of the profit share and the output-capital ratio, allows us to focus on industrial policy aimed at raising the profitability through economic measures that redistribute income or increase the productivity of capital.

Finally, to estimate the impact of the various status options on the overall profitability we estimate the changes in industries’ total profits, as would be accounted for in the vector of value added. These benefit losses were computed by calculating the amount of taxes that the various industries would have to pay as a percentage of the tax benefits that the industries enjoyed under section 936. This information comes from the Government Development Bank (1993), Puerto Rico Planning Board (various years), the Congressional Budget Office (1990), KPMG Peat Marwick (1991), and some considerations by other authors like Meléndez and Ruiz (1993), Colón (1993), Green (1993) and Negrón (1993). For the independence option we will weight the relationship between taxes and subsidies.

Results and Conclusions

From the data presented in our paper, and the results of our model, we can conclude that, compared to “Non-bank US Foreign Affiliate Corporations” (IRS: 1990; US Department of Labour: 1992), and even to the average rate of return on investment of US foreign direct investment in several Asian countries (Economic Development Board of Singapore: 1993), most industries in Puerto Rico would still be more profitable under both Statehood or Commonwealth, while the Independence option will be bounded by the effective profit rate of the other two status options. Only in a few cases would the Commonwealth option be at least as profitable as the comparable measure for the US foreign affiliates, while the Statehood option would become less profitable. This is the case, for example of the construction, milk and dairy products and the alcoholic beverages industries. On the other hand industries such as petrochemicals, drugs and pharmaceutical, non electric an electric machinery, metals, telephones, telegraphs and cable, and others would still be more profitable under any status option. This is so because these industries have a highly elastic wage-profit curve

which allows income to be redistributed from profits to social income without considerable reductions in the profit rate.

Take for example the case of the beverages industry, since the Government Development Bank estimated this sector's benefit loses to be one of the biggest (-47.2% benefit loss in 5 years, del Valle: 1993, p. 11) This reduction in total profits would reduce their profit *share* from 108.74% to 57.41%, and this will imply a profit *rate* of 26.41% (down from an approximate 50.02%). From the 1982 input-output matrices, we have that this redistribution of income from profits to the rest of the economy (social income as we have called it) will increase the value of net output per unit of direct and indirect worker that flows to society from \$101 to \$4,174.² This same procedure is the one we suggest for each and every industrial sector, for which we present the specific results in our paper. For reasons of space, we will not present all the results here, but will refer the interested reader to the appendices of the paper.

In all cases, it is important to realize that, in the long run, the profitability of the various industries will also be affected by technological changes that allow industries to increase their output-capital ratio and/or their output-labour ratio in such a way as to increase their profitability. Once we are able to recognize those sectors whose profitability are more affected by changes in the distribution of income, then industrial policy should be oriented towards those sectors which have the capacity to increase what we have called "social income" while compromising the least their profitability. The policy options that should be developed are related to the technical methods of production, productivity and the degree of

mechanization. Noting again that $\frac{P}{K} = \frac{P}{Y} \cdot \left(\frac{Y}{L} \frac{L}{K} \right)$,

where $\left(\frac{P}{Y} \right)$ is "status dependent", then we address the issue of profitability in terms of economic policy intended to increase output per labour and the efficiency of capital. (Green 1993)

Although the technical methods of production chosen in each industry limit their responsiveness to changes in the profit rate (and that is independent of status considerations), it is through institutional measures, which are basically status independent (Green: 1993), that these industries could respond by implementing measures that increase the productivity of capital and labour (workers training programmes, adoption of new technologies, increase in the capacity utilization and efficiency, etc.) Status considerations alter the relative distribution of functional income. In this way we can view the profitability of an industry as the result of the interplay of three factors: (i) the profit share, (ii) the degree of mechanization in that particular industry, and (iii) labour productivity. Considering that we are interested in policy options that do not require "income oriented" policies (like taxes or subsidies), this framework shows that under *any* status, the increase in the profitability of that sector, it is necessary to either increase the "efficiency of capital" or increase the productivity of labour, or a combination of both. It is noteworthy that these ratios have been computed on an industry by industry basis, thus enabling the policy maker to devise policies particular to each industry, depending on which of these variables is more flexible in each sector. In this particular Ayala (1989) found that for the 1972-1982 period out of 43 industries she studied, only 8 showed a decrease in productivity levels, as measured by the ratio of net output to direct and indirect labour requirements (that is "sectoral" as opposed to "industrial" productivity). Thus, industrial policy should take advantage of those sectors which have shown a rapid and strong increase in (labour) productivity, while at the same time devise economic policy instruments aimed at enhancing productivity in the other lagging sectors of the economy.

**Professor of Economics, University of Puerto Rico.*

2. Given that the regression form of this sector's wage-profit curve is $w = 8.73 - 17.25 r$, we have that a reduction of 47.2% in total profits means a new profit share of 57.41% (new total profits of \$198,345 ÷ 345,457). At an output-capital rate of 0.46, we get a new profit rate of 26.41% (0.5741 x 0.46). Inserting these values in our regression ($\$4.174 = 8.73 - 17.25 * 0.2641$ and $0.101 = 8.73 - 17.25 * 0.5002$) we get the estimated results presented above. See also Ayala: 1989 for an excellent discussion of these measures. (Note that data presented ins in thousand dollars.)