

**The impact of a minimum regional wage on the Parana's economy:
an application of the Iguassu CGE model**

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The proposal for the adoption of a state of Paraná minimum wage at a value between 427 and 437 reais has stimulated intense debate¹. Those who have followed the debate have discovered that the arguments presented are poor in quantitative analysis and often more representative of wishful thinking than of a proposal that is adequate to harsh reality. Some basic economic principles have been left out and the discussion that is presented is heavily conditioned by its immediate political effects. Among these basic principles, one of the most important is that the economic system is characterized by the great interdependence of markets. This means that nothing occurs in one part of the system without repercussions throughout the rest of it.. Another fundamental principle is that remuneration of production factors is to some extent a result of their productivity. Thus, an increase in remuneration that raises it higher than productivity itself would necessarily mean the relative reduction of the use of these factors. It is also true that an increase in personal income would lead to greater buying power and therefore, greater product demand. However, this is only true for those who are able to maintain their sources of income, which is clearly not the case for workers who have lost their jobs. In short, adopting a minimum state wage at the levels that are being proposed would mean, on the supply side, a strong costs shock within the economy. On the demand side, the shock would be lesser, as a consequence of the ensuing high levels of unemployment. The state would lose its competitive edge in relation to other states as well as within a global context, since production costs would raise significantly, unaccompanied by equivalent compensatory measures.

The situation described above is easily visualized by whomever has a minimal notion of how a market economy functions. Although these processes are not easily quantifiable, it is precisely such work that distinguishes economic analysis from mere opinion. In economics, everything is interdependent, yet these interdependent processes do not necessarily occur simultaneously in real life. The time that is considered necessary for all the adjustments to a shock be made, short term, throughout

¹ This debate occurred during the first semester of 2006.

the entire economy, is usually considered to be in the vicinity of two years. However, these calculations are very complex and difficult to realize; the information they require is always insufficient. This situation leads us to believe that the current debate is being carried out on the basis of very scant information on the major implications that the measure would have for the lives of all those who live within the state.

In the interests of contributing to the debate, we have attempted to quantify the impact of the proposed new state minimum wage through the usage of a CGE model –the Iguazu model- which has been put together through work being done within the Post-graduate Program on Economic Development at the Federal University of Paraná. The so-called CGE models are at present the most modern and powerful of existing methodological instruments for economic analysis. Their usage is undergoing rapid dissemination in Brazil and throughout the world. The reason for such success lies in the opportunity that these models create to test theories and in particular, for the analysis and evaluation of economic policies. The application of these models covers almost all fields of economic theory, from macro-economics to environmental economics. They also enjoy vast applicability within the field of economic policy, where they have been used for dealing a wide range of problems, from the evaluation of a new tax to the simulation of the effects of poverty reduction programs. A basic model CGE model considers the economy as a system of interdependent markets in which the values of equilibrium for all variables are determined simultaneously. Exogenous disturbances within this economy can be captured through the calculation of the set of endogenous variables that characterize it. Thus, we see that the construction of these models is highly complex and may contain thousands of equations.

The Iguazu Model is a CGE model that was initially elaborated at the CoPS (Centre of Policy Studies), University of Monash, Austrália.² It is a static model developed for use with social accounting matrixes (SAM). In the case in point, data from the Paraná matrix of social accounting were applied within the basic model. In this form, the model then includes 41 industrial sectors that produce 41 different products, that is, each sector produces just one type of product and considers four ways of employing labor power. The model follows traditional neo-classical hypotheses of

² *The model can be accessed through the following website:*
<http://www.monash.edu.au/policy/archivep.htm>

economic rationality, which means that each sector minimizes its production costs subjected to constant returns of scale; input prices are a given. Families use their income according to traditional functions of maximizing utility. In terms of foreign trade, two regions are considered: the rest of Brazil and the rest of the world. Furthermore, imports are a composite good that are used in different proportions within all sectors.

Six simulations were carried out that considered the impact of an increase in the minimum wage within three different short term scenarios. Each scenario corresponds to a closure on the basic model, which in short, illustrate different forms of thinking on the functioning of the economic system. For each scenario, the impact of an increase in federal minimum wage (from R\$300 to R\$350) and the impact of the new proposed state minimum wage (R\$427 at the first level) were calculated. For these purposes, the structure of the working population for the state of Paraná by income categories was considered, data which was made available through the most recently published PNAD³ census. Registered and non-registered workers were accounted for, as well as autonomous (self-employed) workers and employers. Civil servants were excluded, since the proposal for a state minimum wage does not apply to them.

A possible analysis of the impact of the new minimum would consider that this increase is uniformly applicable to the entire mass of workers. Nonetheless, such an assumption does not correspond to reality. Within the wage structure, the minimum wage functions as a baseline and when this baseline goes up, it has an impact on all other levels, although at a decreasing rate. This means that salaries which are only slightly higher than the minimum are readjusted in terms that are very similar to those of the minimum wage. At higher wage levels, there is also readjustment, although proportionately lower. The total impact that these changes produce over the mass of all salaries is contingent upon the proportion of each wage level within the cost structure of each productive sector and is also be influenced by the particular region of the state of Paraná that the sector is located within. As we can see, effective calculation of impact is very difficult and demands considerable effort.

As such, in order to simplify our study, we began from a very conservative hypothesis. We considered that the impact of the minimum wage would be

³ Pesquisa Nacional de Amostra de Domicílios is an annual household survey

felt only at the lowest ends of the scale, that is, for the wage level that goes up to two times the minimum wage and in the state of Paraná corresponds to more than 52.7% of the working population. Thus, the new minimum wage that has been proposed by the federal government and represents a nominal increase of 16.7% in relation to the earlier minimum wage would mean an increase in at least 8.8% of the mass of salaries paid within the state. Furthermore, the minimum state wage of R\$427, which means a nominal increase of 42.3% in relation to the earlier standard, is equivalent to an increase of at least 22.3% in the total mass of salaries paid within the state. It is probable that real impacts are even greater, although the difference is probably minimal. Table 1 illustrates these numbers.

Table 1- Alterations in the nominal minimum wage and proportionate increase in the wage bill making up to 2 times the minimum

Base Wage (Reais)	New Wage (Reais)	Variation %	Increase in the wage bill (%)
300,00	350,00	16,7	8,8
300,00	427,00	42,3	22,3
350,00	427,00	22,0	11,6

The first scenario takes the economy as functioning under the typical assumptions of an input-output matrix. We will refer to it as scenario IO. Under this traditional input-output closure, all factors (including importations) present elastic supply at fixed nominal prices. As a consequence, there are no alterations in the relative prices and the model works as a typical input-output model. Family consumption is linked to regional income and has strong multiplying effects. Just as in the case of a positive shock in demand this is the major underlying factor, so in the opposite case, a supply shock, it is also the factor that is most responsible for the negative effects that such a shock has.

Within the second scenario, the economy works in a way very similar to how it is understood within neo-Keynesian economic thought. We will refer to it as **NeoKey**. This “Neo-keynesian synthesis” closure is the same as the input-output type, but for the fact that in this case the capital stock in each sector are fixed. This produces an increase in the slope of supply curves. This is how the stimulus that comes from additional governmental spending makes price level rise. Once prices are fixed in

nominal terms, high prices lead to a drop in real wages – and thus, employment and GDP may fall.

The third scenario considers the workings of the economy according to patterns predicted by the ORANI model (basic for the construction of models of general equilibrium). In the ORANI model short term closure, real wages and capital stock in each sector are fixed; components of real absorption (demand) are exogenous (expenditures are not tied to income). Labor supply is elastic. As a consequence, the increase/decrease for goods that require high labor intensity (such as Governmental Administration) expand/contract employment with little rise/fall in prices. The GDP grows at rates near the increase in expenditures, although a certain leakage occurs through the Trade Balance.

The three scenarios, possessing greater or lesser degrees of adjustment to reality, are representations of the way an economy works. From the way they have been shaped, we can probably consider the ORANI scenario to be the closest to the way a real economy works, followed by the Neokeynesian one. The input-output scenario, since it has technical coefficients and fixed prices, functions as if there were no restrictions on the supply side. Supply is able to satisfy demand. All increase in cost is covered in full by reduction in production. The scenario does not consider alterations in relative prices and the substitution of more expensive production factors with cheaper ones. It is the one that is most affected by adverse or favorable shocks.

Simulation results can be seen in the following tables. Table 2 demonstrates the impact of new minimum wages on the main macro-economic variables of the state economy. Under whichever of the scenarios that is considered, the adoption of a minimum wage of R\$427 leads to major reductions in the real GDP. The worst scenario, IO, shows a reduction of as much as 11.57% of the real GDP. The most realistic scenario, ORANI, shows a reduction in the real GDP of approximately 4.19% while in the case of the increase to R\$350 proposed by the federal government, the reduction would be significantly less, that is, a scarce 1.74%. The reduction in aggregate employment also shows much higher rates, 14.27% in the IO scenario and 10.32% in the ORANI scenario. All of this would be a consequence of the increase in the real average wages. This wage increase, in addition to the drop in employment levels, also means rises in general price levels of as much as 5.29% as indicated by the ORANI scenario, and also in exportation price indexes. The volume of exports to other parts of Brazil and

abroad would also drop considerably: 21.64% in the IO scenario (an exaggeration) and 10.45% in the (more realistic) ORANI scenario. The trade deficit as a percentage of the GDP would more than double and even imports would undergo a fall as a consequence of the fall in the real GDP. Real family consumption does not auger well in any of the scenarios given – suffering negative effects within the IO scenario and null effects within the ORANI.

Table 2 – Impact on Main Macro-economic Variables						
	IO scenario		NeoKeyn scenario		Orani scenario	
	MW 350,00	MW 427,00	MW 350,00	MW 427,00	MW 350,00	MW 427,00
Real Family Consumption	-3,33	-7,34	0,06	0,24	0	0
Index of Export Volume (ROB+ROW)	-9,52	-21,64	-3,47	-8,46	-4,27	-10,45
Index of Import Volume (ROB+ROW)	-7,5	-17,04	-1,76	-4,28	-2,21	-5,46
Real GDP	-5,16	-11,57	-1,4	-3,32	-1,74	-4,19
Aggregate Employment	-6,46	-14,27	-3,64	-8,31	-4,51	-10,32
Average Real Wages	6,63	16,49	6,97	17,29	8,78	22,31
General Price Index	2,01	4,99	1,69	4,28	2,08	5,29
Export Price Index	2,02	5,0	0,71	1,78	0,88	2,23
Variations in Trade Balance (ROB + ROW) as % of GDP	-1,86	-4,53	-1,49	-3,62	-1,82	-4,42

Nonetheless, the most catastrophic results are revealed in Table 3. It shows the impact of a reduction of use of the labor factor within the universe of those earning up to two times the minimum wage. To the contrary of what common sense would indicate, the sudden rise in base level wages to R\$427 would not be beneficial for over half of the state labor force. It would mean a significant reduction in the use of labor, which in common language means that high rates of unemployment could be expected precisely for the sector of the population that is supposed to be benefitted. The most drastic reductions occur exactly within the categories of autonomous workers and their employers, which refer specifically to small business owners and autonomous workers. In second place come registered workers and in the last place, those who are not registered, precisely because it is in the latter case that real wages are lowest, yet a rise base wage levels would also place pressure on costs. A general increase in the “informalization” of work within the state can be expected.

Table 3 – Impact over Total Use of the Labor Factor			
	IO Scenario	NeoKeyn Scenario	Orani Scenario

	MW 350,00	MW 427,00	MW 350,00	MW 427,00	MW 350,00	MW 427,00
Registered Workers	-6,76	-14,94	-3,74	-8,56	-4,64	-10,64
Unregistered Workers	-3,68	-8,04	-2,33	-5,2	-2,88	-6,4
Autonomous Workers	-9,23	-20,42	-5,06	-11,66	-6,27	-14,49
Employer	-8,1	-17,95	-4,46	-10,26	-5,54	-12,8

Simulations such as these reveal the static impact of economic shocks. Much care has to be taken in the interpretation of results. Since the impact is static it does not take compensatory shocks flowing from the action of economic policy into account, for example, reduction in money supply to reduce the inflationary pressures of excess demand or tax reductions made to compensate another increase in costs. These numeric results are valid more as a way of appreciating the magnitude of effects than as absolute numerical results. Even with such restrictions it is possible to say that short term, with all else kept constant, the tendency to adjust the Paraná state economy to a costs shock produced by raising the minimum wage to R\$427 would lead to a major fall in the real state GDP, high unemployment rates, and loss of state competitiveness in relation to other Brazilian states and the rest of the world. It is also possible to predict an increase in the informalization of work, with all the adverse consequences that this would entail. Particularly those sectors that are most fragile today, such as maids and some kind of service providers, could be expected to be the hardest hit. Labor intensive sectors could also suffer great short term restrictions. The way in which these sectors will react in the long term can also be simulated, although lack of pertinent information discouraged us from performing such an exercise. Some speculations can be made in this regard, yet they tend to be based more on opinion than on analysis, and thus escape the spirit of the present work.

Within the heat of current debate, the consequences that a costs shock as drastic as the one represented by a state minimum wage of R\$427 would have on life within the state of Paraná are too significant to be ignored, This paper is meant to contribute to more fruitful discussion on this matter, through its offer of greater information on the magnitude of such impacts.