

Effects of Social Security Reform in Argentina on labor markets and poverty.

Maria Laura Alzua *and Hernan Ruffo †‡

October 10, 2006

PRELIMINARY DRAFT - DO NOT QUOTE

Abstract

In 1994, Argentina introduced a major reform to its social security system: mainly Pension Reform and Unemployment Benefits. Such reform was part of a vast program aiming at modernizing its economy, including establishing a currency board to reduce inflation, a huge privatization program, trade liberalization and deregulation. The results in terms of stabilization and growth were impressive. Capital inflows and investment also grew very fast. However, employment stagnated, poverty augmented and income distribution worsened. While it can be argued that the deterioration of these social indicators was to some extent the result of the economy being hit by external shocks (Tequila crisis, etc.), the transformation of the social security system also had a significant effect over the evolution of social indicators. We will analyze the effects of the introduction of a new individual accounts in Pension System -which is under

*malzua@ieral.org, IERAL, Viamonte 610, 2nd floor, Buenos Aires, Argentina, (1053)

†hruffo@ieral.org, IERAL, Viamonte 610, 2nd floor, Buenos Aires, Argentina, (1053)

‡This research has been possible thanks to PEP Network Support.

effect since 1994- over wages, employment and poverty. While the macroeconomic effects of a change in the pension system is an issue that is relatively well addressed by the literature, its microeconomic effects are often neglected in the analysis.

We use a CGE model to evaluate the effects of the reform on labor market and poverty. Our results indicate that if private pension funds are allocated to physical investment, labor demand and wages increase and poverty goes down. However, these effects fade out if funds of private accounts are used to buy government debt.

1 Introduction

In the early nineties Argentina launched a major program aiming at modernizing its economy. It included, among other things, a stabilization plan (“Convertibility Plan”¹), trade and financial liberalization, privatizations of public firms and services, and deregulation. These reforms were an attempt to break the long history of huge fiscal deficits financed by money printing, which caused high inflation and required sub-sequent devaluations in order to avoid real appreciation of the exchange rate.

In many aspects, this plan was a huge success. The country registered a period of large capital inflows, low inflation, high rates of growth fueled by productivity gains and high investment.

The Social Security System was also reformed in 1994. During the eighties, Social Security was characterized by large deficits and high payroll taxes, strong regulations in labor markets with centralized bargaining processes and some other inefficiencies. One particular problem were the multiple sources of litigation related to job accidents: compensation for every accident had to be solved in court and the amount of

¹The “Convertibility plan” included a strict currency board, which pegged the local currency to the US dollar. This strict rule aimed at giving predictability to the monetary authority, reducing expectations of high inflation.

compensation was contingent to each particular case. Such costs represented a non insurable risk for employers.

The pension system was financed as PAYG, and had some weaknesses. On one hand, some pensioners had not contributed to the pension system during their working years, and became beneficiaries because of a “moratoria”². On the other hand, the old system was not sustainable due to other political aspects. For example, some provinces gave high retirement benefits to its former public servants. These facts explained part of the high deficit generated by the old system, which imposed a high payroll tax burden on working population. Furthermore, Argentina has one of the most aging population within Latin American countries, what progressively increases the dependency burden and the long run deficit.

A major overhaul to the Social Security System was needed in order to reduce the impact of the increase in the dependency rate, improve efficiency, reduce the already high non-wage labor costs and to increase coverage of displaced workers due to adjustments (privatizations, public sector employment layoffs and openness) in the labor markets. The Social Security Reform included the following aspects:

- Introduction of Unemployment Insurance in 1991.
- Implementation of a pension system reform: All workers could opt between continuing in PAYG public administered system or joining personal account systems (previous contributions to PAYG system were recognized in the definition of benefits) run by private companies known as AFJP or *Administradoras de Fondos de Jubilaciones y Pensiones*, (Pension Fund Companies).
- Increase of family allowances on a progressive basis.
- Some degree of competence was introduced in the health insurance system.

²A massive “pardon” which allowed people without enough working history to obtain a pension.

- Constitution of a “work risk” insurance system through a law that defined the amount for automatic compensations for all accidents and professional illnesses. Private companies known as *Administradoras de Riesgos del Trabajo* or ART provided insurance service, collecting a fixed amount per worker in each firm and covering compensation costs.

From all these reforms, the pension system one was by far the most important, both in terms of social security and because of its macroeconomic implications. Huge amounts of transfers were devoted to private pension administrators. The deficit generated by the introduction of such system, was covered with an increase in public debt and, while payroll taxes were reduced, VAT increased over the period.

All these changes to the Social Security System were implemented in the context of a great adjustment at the firm level due to openness, deregulation, privatization, reduction in the price of capital and, after the “Tequila”³ crisis, an sharp increase in unemployment.

After the initial success of the stabilization plan, per capita GDP grew more rapidly than any other period during the last 50 years. The capital stock recovered from the corrosion of the 80’s. Technological change, fueled by renewal of physical capital, new firms and foreign direct investment, increased total factor productivity.

However, poverty did not decreased at the same pace that mean income grew. After the first successful stage of the stabilization plan, from 1994 on, poverty started to grow. Inequality also increased significantly: from 1992 to 2001 (the *Gini* coefficient increased in 9 points). This intriguing evolution of poverty and inequality is explained basically by labor market weaknesses in a context of an increased unemployment and

³When Mexico decided to devalue its currency in December 1994, foreign investors feared Argentina will abandon the currency board, and 18% of private deposits fled the country. Interest rates soared, many small and medium sized banks went bankruptcy. GDP shrank by 4.5% in 1995 and unemployment peaked 18.6%.

greater labor informality⁴⁵ in spite of macroeconomic growth.

Employment level only grew at a 0.7% annual rate from 1991 to 1996, with a big drop in 1994-1995. From 1995 to 1998 while GDP grew at a 4.3% per year, employment grew at a 3.1%. Growth in employment was not enough to reduce the unemployment rate, which average 15% over the whole period considered. Reforms in the pension system were implemented in 1994. After the reform, the aim of increasing coverage was far from been reached since labor informality step up from 28% to 36%. Also, the elderlies' coverage was also reduced progressively after the reform, making some households poor and worsening the dependency burden for other households, as it can be seen in Graph 1.

Poverty and inequality are strictly linked to the lack of social security coverage. Low and instable salaries, lack of allowances and lower tenure in jobs is the main explanation for income poverty. Households are also more vulnerable to shocks like displacement, accidents and illnesses.

This informality-poverty relationship is also characterized by a vicious circle with both short and long run implications, and multiple reinforcing effects. First of all, low wages imply little or no savings, especially in large households with unstable work. Secondly, the lack of unemployment benefits and health insurance reduces households' opportunities to maintain an acceptable level of health and nutrition. For example, in the case of head of household of illness, the increase in expenditures and the reduction in earnings must be faced with savings or debt.

Furthermore, the high displacement rates of the informal jobs affect the specific human capital accumulation. This fact, and the high opportunity costs of extending search time due to the urgency of generating income, will increase the probability of accepting an informal and low wage job.

⁴Poverty and income distribution indicators worsened even more as a consequence of the devaluation of the currency in January, 2002.

⁵We define an informal worker as a worker who does not contribute to the Social Security System.

In spite of the initial growth in GDP, high investment and capital inflows, the Argentine economy was hit successively by the Asian crisis, the Russian crisis and the Brazilian devaluation. The rigidity of the monetary rule (Convertibility Regime) which pegged the value of the local currency to the USD dollar caused a real appreciation of the currency through two channels: nominal and real appreciation of the US dollar against other major currencies and devaluation of Argentine trading partners currencies. Growth stagnated after 1999 and unemployment, labor informality and poverty increased. By the end of 2001, capital outflows made it difficult to sustain the peg. The government resigned in the middle of street riots and upheavals an interim president took charge. The currency peg was abandoned and the level of activity went down. (GDP contracted 11% in 2002 and unemployment peaked 25%) The economic contraction was one of the worst in the whole Argentine history. Poverty and unemployment soared, and the government introduced massive unemployment assistance for the unemployment head of households, since the existing unemployment benefits regime had very few beneficiaries. While the previous Social Security Reform was something that took careful planning, this new unemployment assistance was an “emergency” law and was done in order to cope with the collapse of the Argentine economy in the first half of 2002.

This paper is organized as follows: section 2 presents the research objectives, section 3 summarizes the main changes introduced by the reform and section 4 describes the methodology utilized. Section 5 shows the results and finally, section 6 concludes.

2 Research objectives

The main objective of the paper is to measure the effect of the Pension Reform (henceforth PR) on labor markets and poverty. This is a question of extreme policy relevance since the transfer of resources from the public to the private sector implied

by the pension reform had significance macroeconomic impacts for the economy. The social security system redistributes an amount equivalent to 10% of GDP, while pension system alone represents a 75% of that total. Pension reform deviated around 1.5% of GDP towards private accounts and increased social security deficit, inducing an increase in general taxes.

Moreover, As it has been mentioned in the introduction, empirical evidence about the microeconomic effects of the Social Security Reform are not very well known for the case of Argentina.

3 The Social security Reform in Argentina

From 1994 and on, several reforms were implemented in Social Security taxes. The main one was the change of the PAY-GO system to a individual account system. Each worker could opt between systems. Thus, the relevance of the reform depended on the workers preference. While most workers would be better-off after the reform, older ones would not be benefited. Thus, younger workers decided to join the new system massively.

Other instruments were also important to promote the preference for individual account system:

- The government implemented a fixed amount contribution that was relevant only for distributional reasons and for inducing workers to opt for the new system.
- The government also granted a minimum amount of pension for workers in the new system.
- By default, every new worker was assigned to the new system, except those that stated otherwise.

- Once in the individual account system, the worker could not go back to PAY-GO system. The inverse was possible.

On the whole, after two years, 70% of the workers was contributing to individual accounts, and after four years, this proportion reached 80%.

This change had several influences in the economy, which we will include in our analysis.

First of all, there was a very significant transference from government accounts to the private financial system, increasing government deficit. The gap in PAY-GO social security system, the transition cost, was not only relevant for its amount but mostly for its irreversibility: the transition cost would fade out only in the long run.

After the implementation of this reform, Argentina suffered the impact of “Tequila” crisis, that reduced activity level and labor demand. Moreover, informality, jumped from around 29%, to 35% within two years. Formal labor demand was crucial to limit Social Security deficit. To stimulate labor demand, and particularly formal labor demand, **Social Security taxes were significantly reduced** in 1995 and in 1996. While the impact of this reduction over informality is still under controversy, the incidence over Social Security deficit was at least as big as the reform.

Government implemented two ways to face this impact over public accounts. Firstly, it raised the VAT rate from 18% to 21% in 1995. This increase was introduced in order to improve government income without affecting formal labor demand. Nevertheless, the VAT increase affected formal labor demand negatively, through an increment of the hidden economy and, thus, informal workers demand.

Secondly, **government captured pension funds through public debt**. As AFJP portfolio decisions were regulated, these institutions had to buy periodically significant amounts of public debt. This was a way of financing Social Security transition costs.

From the point of view of capital market, the reform also had a significant impact.

The proportion that was not captured by public debt was invested in financial assets, such as bank deposits (16% of the aggregate portfolio) and equities (almost 30%). On the whole, and to simplify, a 50% of the individual accounts were invested in public debt and the remaining 50% on capital market or private sector through financial intermediation.

Nevertheless, from the whole amounts derived to individual accounts, a relevant proportion (firstly around 30%, then declining to 20-25%) was retained by these financial institutions as fee. This can be seen both as an economic impact over an specific sector of activity (financial intermediation services) and as a reduction in the total amounts that were oriented towards private sector. While this issue can be relevant, it was compensated by the financial accumulation of the funds (returns to financial investment increased total funds at a 10% cumulative rate).

In any case, this **financial stock oriented towards financing investment** increased the pace of accumulation of capital stock. In particular, the capital stock from 1994 to 2000 raised almost 60 billion of dollars/pesos. The portfolio of AFJP accumulated at the end of the period was around pesos 8 billions oriented to private sector.

These issues are the main ones that will studied in this paper. Nevertheless, several other impacts can be also relevant.

First, labor supply can increase significantly due to the reform. Advocators of Social Security reform noted that that PAY-GO system was not highly valued by workers because historically government tended to use Social Security amounts in order to finance current deficits. Instead, individual accounts would be regarded as private savings. In was expected that this effect would boost labor supply towards formal sector, because of the increase in valuation of social security benefits. This effect would contribute to formalization, reducing transition costs.

While the valuation aspect is important in the analysis of Social Security Reform,

it was not yet implemented in our model. Nevertheless, it should be said that by 2000 or 2001 this valuation was on risk due to the high proportion of AFJP oriented to financial assets that were in risk of default. Thus, the evolution of valuation is still a matter under discussion.

Secondly, households expectations about future pensions improves their estimated wealth, increasing consumption. In other words, the increase of savings through social security system would be compensated by a reduction of household current savings.

Again, this aspect is not included in the model, because, so far, no evidence was found that private savings had diminished due to Social Security Reform.

On the third place, another aspect that is not accounted in the model is the long-term impact of Social Security Reform over the Social Security deficit. In fact, transition costs would eventually vanish in the future, and begin to show the fiscal benefits of the reform. The analysis that we implemented in the model implicitly assumes that the new deficit is constant. In any case, this assumption is not entirely misleading, given that calculated transition costs would be practically constant (between 1.5% to 2% of GDP) for 25 years (up to 2020).

Finally, a Social Security Reform implies a swap in public debt between implicit debt (present value of the future payments of PAY-GO system) and explicit debt. The difference is not rhetorical. Default of implicit debt can be implemented without punishment in financial markets, reducing pension payments (by inflation, for example). On the other hand, the burden of implicit debt is reduced, rather than increased, by an increase in real interest rate. Furthermore, rollover of implicit debt includes only annual expenses and not the total stock of debt. Thus, if the probability of default rises, explicit debt is significantly more risky than implicit one.

4 Methodology

The kind of reform we are going to analyze has two important dynamic aspects: its effects on capital accumulation and the long run viability of such reform. In this sense, we are aware that pension reform effects will be better appraised by using a dynamic model. However, as a first attempt to start exploring PR effects on labor markets and poverty we will use a static model.

4.1 The Model

In order to analyze the effects of the Pension Reform on the labor market we built a static Computable General Equilibrium (CGE) model for the economy of Argentina, based on Decaluwé et al.(2001). Since one of the most important issues to address when evaluating a Social Security reform are its effects on the labor market, we modified the basic model in order to allow departures from perfect competition in such markets by assuming efficiency wages, endogenized labor supply and allowed for the existence of formal and informal labor.

The main features of the model are:

- It is a multi-sector small open economy model with 11 sectors⁶
- We assumed Argentina has seven trading partners: Brazil, Mexico, Canada, USA, European Union, Rest of Latin America and Rest of the world.
- Perfect competition is assumed in all sectors.
- We assumed there are four representative households, according to the amount of formal/informal labor they supply to the market: Formal households (HH1),

⁶Agriculture and food industry, Extractive, Textile, Clothing and footwear, Wood paper and furniture, Oil and refining, Non-metal manufacturing, Utilities, Construction, Government and Other services.

Semi-formal households (HH2), Semi-informal households (HH3) and Informal households (HH4).

- Government collects tariffs and taxes on commodities and on labor. Government revenues are used to buy good and services and to make transfers to the households (pensions, unemployment insurance, etc.). We assumed fixed public savings.
- On the production side, we used a nested production function. At the top level, firms combine intermediate inputs with value added using Leontieff technology. Value added is obtained with a Cobb Douglas function which combines formal, informal labor and capital.
- Total demand for each sector is composed by domestic demand plus exports.
- Domestic consumption is a composite (Armington) of domestic and imported goods.
- Trade balance is fixed
- There are three factors of production: capital, formal and informal labor.
- We use a non-competitive framework for modeling labor markets. Following Annabi (2003), Harris and Todaro (1970) and Shapiro and Stiglitz (1984) we introduce efficiency wages and a modified Harris Todaro condition in order to generate involuntary unemployment in the formal sector and a wage differential for formal and informal jobs.⁷
- Capital supply is exogenous, but, after the introduction of the Reform, a given proportion of funds coming from Pension Funds are invested in physical capital.⁸

The model was run using GAMS.

⁷See the appendix for a detailed description of the labor market modelization.

⁸See the appendix for a detailed description.

4.2 Calibration of the model

4.2.1 Argentine SAM

The model was calibrated using a Social Accounting Matrix (SAM) which uses Input Output tables for 1997 and it was updated to 2000. It was taken from Petri and Mendez Parra (2000). The Argentine SAM is based on the disaggregation of the sectors of the 1997 Argentina's Input-Output Tables (MIPA-97) built by INDEC. We modify the SAM built by the Secretariat of Agriculture, Livestock, Farming, Fisheries and Food, henceforth SALF-SAM.⁹, which updates the 1997 data up to year 2000. The SAM is based on an Input- Output table had a detailed breakdown of the agricultural sector (47 categories) and a total of 64 sectors. We proceed to a brief description of the basic structure of the SALF-SAM.

The production factors included in the SALF-SAM are labor, land and capital. All factors are considered homogeneous. Labor demand was estimated using the MIPA 97, the Permanent Household Survey (EPH-INDEC) and the cost product structures. Average wages are obtained from the MIPA 97.

Household consumption is drawn from the National Expenditure Survey (1996-1997).

It is assumed that firms are homogeneous and they receive all the capital payment, i.e. there is no payment between factors. Households receive payment from labor and firms receive payment from capital and then they made payments to households. Capital payments are computed as the residual part from the value added after payment to labor (gross production surplus).

Government consists of the national, provincial and city governments. Data from government investment was provided by DNIP¹⁰ and expenditures from DNGC¹¹.

⁹Gerardo Luis Petri and Maximiliano Mendez Parra, "The 2000 Social Accounting Matrix for Argentina"

¹⁰Dirección Nacional de Inversión Pública

¹¹Dirección Nacional de Gasto Consolidado

In order to compute national taxes, tariffs and social security payments, information from the AFIP¹². At the provincial and city level, data from DNGC were used.

For the saving-investment account, data from the DNCN¹³ and DNCPM¹⁴ were used.

As far as the rest of the world is concerned, countries were grouped in seven: Brazil, Mexico, Canada, United States, European Union, Rest of Latin America and Rest of the World. All the trade data was provided by the Argentine Customs Office.

The SAM was not properly balanced, because the differences in the valuation of magnitudes from supply and demand. The approach used to balance the matrix is the one developed by Robinson and El-Said (2000), known as the cross entropy method.¹⁵

The SAM was built on data from 1997, but an update to 2000 was made. This year was the last of “normal” economic activity for Argentina before the crisis of 2001. In order to do this update, gross value of production and supply and demand by sector data was obtained from the DNCN.

The updating process consisted on using the technical coefficient from the SAM 1997 and applying to the row and columns total values from 2000. In this way, a SAM with final values for 2000 was obtained, but keeping the relatives prices structure and technology from 1997.

4.2.2 Modifying the SAM

For the sake of this work, we aggregate back all agricultural breakdowns and make specific modification to the household income-expenditure structure which we will specify below.

We used the Household Survey for May 2000 (Encuesta Permanente de Hogares)

¹²National Revenue Agency

¹³National Accounts Office

¹⁴Macroeconomic Programming Office

¹⁵For a more detailed analysis see Petri et al. (2005)

Table 1: GDP structure

	% of Output
Agriculture + Food Manufacturing	24.2%
Oil, Mining and Extractive Activities	4.7%
Textile, Clothes and Footwear	5.7%
Wood, Paper and Printing	4.9%
Oil and Refining	5.5%
Non Metal Manufacturing	4.1%
Metal Manufacturing	7.1%
Utilities	7.9%
Construction	8.2%
Government	9.1%
Other services	18.6%

in order to calculate the sources of income and the structure of the four representative households.¹⁶

We also used the information available in the Household Survey in order to characterize the household supply of labor.

We used the Expenditure Survey in order to build the consumption of each representative household. Expenditure information available for Argentina is relatively poor compared to that of income. The last expenditure survey is available for 1996-1997. We updated this information to year 2000 using the Consumer price index for each item we describe in the appendix. In order to update the ENGH up to 2000, disaggregated Consumer Price Indexes were used.¹⁷

¹⁶The following income sources appear in the Household Survey: a) monthly labor income (wages): salaried workers ordinary wage, salaried workers benefits, Self Employed, Company owner, Retrieve production for home consumption, Other non monetary payments (coupons, etc.), b) non labor income: Pensions, Rents/Interests, Benefits/utilities, Unemployment benefits, Severance payments, Scholarships, Alimony, Transfers from people outside the household, Others.

¹⁷See disaggregation in the appendix

Table 2: Demand

	% Demand
Private Consumption	61.1%
Government Consumption	11.5%
Investment	18.5%
Export	8.9%

Table 3: Household's Consumption and Income

	HH Consumption	HH Income
HH1	35.3%	40.7%
HH2	33.8%	31.4%
HH3	20.2%	18.1%
HH4	10.7%	9.8%

5 Social Security Reform - Simulation results

The model developed allows us to simulate alternative shocks, mainly in social security system, taxes, labor supply, capital stock and other relevant issues.

We conducted several simulations with the objective of decomposing the impact of each shock over labor market. Thus, we first present the most relevant simulations, their quantitative implications in the model and their main results. Then we analyze the results and compare them to actual changes registered by the economy after the reform. Lastly, we will estimate the impact of the changes on the labor market on poverty. Finally, we will conclude analyzing the limits of the exercises and plan future improvements of the model.

The following shocks were estimated, both individually and all together:

1. **Pension Reform (PR)** - Individual accounts system: Individual accounts were simulated as a change in Social Security taxes: a proportion of these taxes (80%) are oriented to other destiny but government income.
2. **Physical capital accumulation:** By this aspect, we estimate the total physical capital accumulation that PR introduces to the economy. This amount

is calculated as perpetuity at a 20% rate of annual funds. Sensibility analysis is implemented through the relevant coefficient, that is to say the proportion of individual accounts that are oriented to this end.

3. **Funds captured by the government:** Government closure includes that its result (government savings) are held constant by an increase in VAT. In other words, PR implies VAT increment. Nevertheless, this raise is moderated by the proportion of pension funds captured by the government. This issue is explored through a sensibility analysis of the relevant coefficient, that is to say, the proportion of funds that government captures.¹⁸

We built three scenarios:

- **Scenario A:** Introduction of individual accounts with 75% of the funds directed towards increasing physical capital and the rest in captured by the Government in the form of higher debt.
- **Scenario B:** Introduction of individual accounts, but lowering the percentage invested in physical capital to 20%.
- **Scenario C:** Introduction of individual accounts, that in Scenario A, but for some reasons individual accounts will not be directed towards physical capital.

5.1 Results

The following table summarizes the results of the simulations according to different scenarios. These scenarios are constructed according to the previous shocks. Specifically, scenario A differs from base case in the implementation of Pension Reform,

¹⁸Other experiments analyzed were: cut in Social Security Taxes, an exogenous increase in labor supply, and increase in labor supply towards the formal sector -analytically equivalent to an increase in Social Security Valuation- and finally, a reduction of household savings.

from PAY-GO to individual accounts. This shock is simulated using the corresponding parameters. Parameter c_{approp} indicates the proportion of the SS Tax that is reoriented towards individual accounts. Of that amount, a 25% is captured by public debt (τ_{ao}) and the remaining 75% is invested in physical capital (τ_{aop}).

This exercise does not include any other shock. Nevertheless, it should be noted that government adjusts VAT rate in order to finance the same level of consumption and transfers, and that the proportion τ_{ao} of individual accounts is considered a way of financing expenses. In other words, tax rate increases when SS Tax receipts are reduced.

According to the model and its calibration, the Social Security Reform generates good results without any fiscal costs.

Individual accounts, simulated in this way, generate an increase in both formal and informal wages of 5% and 7% respectively, while capital returns drop 7%. Value added goes up 8%, generating an increase in labor demand of 1%, substituting informal job with formal ones.

This impact depends crucially on capital accumulation effect: all these positive changes are owed to an increase in capital supply of 15%, based on pension funds. If the government captures a higher proportion of individual accounts, say 80%, then the effects would fade out (see scenario B).

On the other hand, if for any case, aggregate amounts of individual accounts would not be invested in physical capital (for example, the investment is oriented to US bonds), then the simulated effect of individual accounts is not positive: wages fall 1%, labor demand also falls and VAT must increase 28% to compensate fiscal deficit. This situation is simulated in scenario C.

Going back to scenario A, pension reform would generate an increase in VAT rate of 7%, which implies a 15% increase receipts that compensates the fall of Social Security taxes collected by government. Government income falls in only 1%, which

is covered by new debt.

Consumption prices would go down, given the reduction in returns to capital, while this reduction is compensated by the increase in VAT.

On the whole, disposable income rises 3% in nominal terms and 4% in real terms. This points out the relevance of pension reform impact over poverty and income distribution, as it increases demand of formal labor, reduces unemployment while it increases slightly labor supply.

Table 4: Simulation Results

Variable and parameters		A	B	C
Parameters				
capprop	Weight of individual account system	0.8	0.8	0.8
taop	Proportion invested in private physical capital	0.75	0.2	0
tao	Proportion captured by government (public debt)	0.25	0.8	0.25
tssf	SS Tax rate change	0	0	0
zeta	Labor supply coefficient	zeta	zeta	zeta
htpar	Labor supply relationship between formal and informal labor	htpar	htpar	htpar
psi	Household savings	psi	psi	psi
Results				
wf	Formal wage	1.054	1.014	0.987
wi	Informal wage	1.067	1.017	0.988
r	Returns to capital	0.926	0.979	0.985
VA	Value Added (GDP)	793,727	748,627	732,352
Ldf	Formal labor demand	239,558	237,511	237,018
Ldi	Informal labor demand	54,219	54,905	54,370
PC	Consumer Prices (average)	1.018	1.028	1.036
PC Agr	Food consumer prices	0.979	0.998	1.002
		5.4%	1.4%	-1.3%
		6.7%	1.7%	-1.2%
		-7.4%	-2.1%	-1.5%
		8.3%	2.2%	-0.1%
		1.2%	0.3%	0.1%
		-1.7%	-0.5%	-1.4%
		-1.4%	-0.4%	0.3%
		-2.6%	-0.7%	-0.3%

5.2 Poverty calculations

To calculate the impact of Pension Reform over households, we implemented a simple micro simulation method.

This method consists of changing Permanent Household Survey database (of May 2000), introducing new levels of employment and wages. Changes in mean wages were implemented changing proportionately all wages of each sector (informal and formal). New jobs were calculated through a random imputation of a new job and wage for unemployed. In other words, a specific number of observation of unemployed workers were changed to employed. A wage was imputed for this observations, according to the mean wage of the group, that is to say, for the workers of an specific industry, sector (formal/informal) and educational level.

Before analyzing the results of poverty calculations for PR scenarios, we will present the method by changing different relevant variables. We will calculate new poverty headcount and severity after introducing changes in labor demand, wages and poverty lines which can be observed in table 6.

Table 5: Changes in poverty

Scenario	Poverty	Extreme poverty	Poverty Gap	Squared Poverty Gap
Base case	0.316	0.082	0.131	0.076
Formal Labor Demand: 5%	0.300	0.077	0.124	0.071
Difference	-0.016	-0.004	-0.007	-0.005
Informal Labor Demand: 5%	0.302	0.076	0.123	0.071
Difference	-0.014	-0.006	-0.008	-0.005
Formal wages: 5%	0.307	0.080	0.128	0.075
Difference	-0.009	-0.002	-0.003	-0.001
Informal wages: 5%	0.309	0.079	0.126	0.073
Difference	-0.007	-0.003	-0.005	-0.003
Poverty line: -5%				
Extreme poverty line: -5%	0.296	0.075	0.122	0.071
Difference	-0.020	-0.007	-0.009	-0.005

Table 6: Simulation results

Scenario	A	B	C
Formal wage	5.4%	1.4%	-1.3%
Informal wage	6.7%	1.7%	-1.2%
Formal labor demand	1.2%	0.3%	0.1%
Informal labor demand	-1.7%	-0.5%	-1.4%
Poverty line	-1.4%	-0.4%	0.3%
Extreme poverty line	-2.6%	-0.7%	-0.3%
Poverty change	-0.023	-0.006	0.009
Extreme poverty change	-0.009	-0.002	0.003

An increase in formal demand of 5% would reduce poverty headcount in 1.6 points and extreme poverty in 0.4 points. Poverty gap would also drop significantly, about 0.7 points, while severity would fall 0.5 points.

Similar results are reached by an increase of 5% in informal labor demand. Informal sector is related to low wages and higher probability of poverty or extreme poverty. Thus, the impact in the reduction of poverty is lower, because every new worker receives a lower level of new income, but the impact over extreme poverty would be higher, because the new workers are more concentrated in those households.

Changes in wages would reduce poverty less than an increase in labor demand. With an unemployment rate of almost 18%, the impact of new employment over income distribution is greater than the proportional increase of wages. Furthermore, households with occupied members have a lower probability of being poor, thus an increase in those households income do not change poverty conditions. Thus, changes in poverty would be less than 1 point and 0.3 points in the case of extreme poverty around. Again, informal sector improvement has a lower impact over poverty and a higher one over extreme poverty.

A change in poverty line would move real income in a higher proportion than an increase in payroll of one sector. In fact, a decrease of 5% of poverty line would move

Table 7: Actual Changes

	1994	1996	1998	1994-1996	1996-1998	1994-1998
Occupied Workers	7799	7539	8298	-3.3%	10.1%	6.4%
Formal Workers	3836	3534	3949	-7.9%	11.7%	2.9%
Informal Workers	1594	1787	2246	12.1%	25.7%	40.9%
Formal Wages	722	693	754	-4.0%	8.8%	4.4%
Informal Wages	453	410	406	-9.5%	-1.0%	-10.4%
Unemployment Rate	13.9	19.9	15.8	43.2%	-20.6%	13.7%
Capital Stock	564,938	593,887	636,592	5.1%	7.2%	12.7%
Value added	250,308	256,626	288,123	2.5%	12.3%	15.1%

poverty headcount 2 points lower while a reduction of extreme poverty line would change 0.7 points the extreme poverty headcount.

These changes in poverty calculations can be used to construct “marginal” impacts of each variable over poverty. For small changes, these calculations are relatively accurate.

The previous table shows the impact in poverty and extreme poverty of different scenarios, calculated using “marginal” impacts. In particular, a pension reform would impact in a reduction of 2.3 points of poverty headcount and almost 1 point in extreme poverty.

5.3 Actual evolution

Are these results comparable to the evolution of the economy after the Social Security reform? This question is difficult to appraise, because the reform was implemented contemporaneously with the “Tequila” effect. Nevertheless, it would be illustrative to split the data in two periods, from 1994 to 1996, and from 1996 to 1998.

The previous table summarizes the evolution of some variables in the relevant period. First of all, occupied workers increased 6% in the whole period and 10% between 1996 and 1998. Over the later years, formal labor demand increased 12%,

while informal workers raised 26%. Wages also account for the distance in labor demand between both segments: while formal wages increased 9%, informal wages declined 1%. Capital stock increased 7% while value added increased 12%.

In these terms, the model can adequately account for some of the main facts. Nevertheless, the labor demand clearly shows a preference for informal workers, jointly with a reduction in informal wages. On the contrary, the simulations estimate clearly the inverse evolution on this behalf.

5.4 Limits of simulation exercises

Our simulations show positive aspects of pension reform, that is to say, the accumulation of physical capital, the increase in labor demand and the changes in social security valuation. Nevertheless, the results are not in strict accordance with actual results. Particularly, labor market segmentation deepened after the reform, through the raise in informality and in the wage gap.

Several reasons may explain this distance between simulated results and observed data. On the first place, labor market was negatively shocked by “Tequila” effect in late 1994. Secondly, individual social security valuation may have well been of the inverse sign of the assumed.

To that end, we construct a new scenario, trying to account for actual changes: an extreme reduction of valuation, a significant increase in labor supply and a relevant increase in consumption.

The results can be observed in 8.

Table 8: Simulation Results

Parameters	Variables and parameters		
	Base case	Near Actual	
capprop	0	0.4	
taop	0	0.5	
tao	0	0.5	
tssf	0	0.5	
zeta	zeta	zeta*0.2	
htpar	htpar	htpar*0.6	
psi	psi	psi*1.8	
Results			
wf	1.000	1.037	4%
wi	1.000	0.889	-11%
r	1.000	0.959	-4%
VA	732,815	789,736	8%
Ldf	236,755	244,307	3%
Ldi	55,154	63,714	16%
LD	291,909	308,021	6%
LS	324,343	340,355	5%
UN	10.0%	9.5%	-5%
KD	404,066	443,493	10%
YDH	579,454	595,252	3%
SSTF	18,420	5,914	-68%
SSTFC	0	7,885	-
SST	18,420	13,799	-25%
txa	1	0.989	-1%
VAT	41,964	45,024	7%
YG	178,823	174,685	-2%
SG	86,131	86,131	0%
PC	1.033	1.005	-3%
PC Agr	1.005	0.972	-3%

We can account for some of the changes observed, but our simulations clearly underestimate the substitution between formal and informal labor which took place. Also, it is probable that, besides calibration, some limitations may be influencing these results, since several aspects cannot be included in our model, such as:

- Substitution between formal and informal activities within each sector: The increase in VAT, for example, does not change the proportion of formal and informal production activity and labor demand. This is a crucial point in the simulations presented. It will be taken into account in next versions of this model, introducing two sectors (formal and informal) per each private sector of the SAM.
- Substitution between skills and complementarity of skilled workers with physical capital. This is a relevant issue, as the capital accumulation effect is the main positive shock of the PR. If the renewal of equipment requires human capital improvements, then the skill biased impact of labor demand would affect income distribution through returns to education and through the wage gap between formal and informal wages. We plan to introduce this aspect in future versions of the model.
- Substitution between implicit and explicit debt. This issue is not negligible, but the model is not capable to account for this factor.

6 Conclusions

On the whole, simulations show positive outcomes in terms of growth, labor market and poverty improvement. These results heavily depend on capital accumulation that pension funds allow.

The main positive effect obtained is a “growth effect”. Financial capital available in the private funds is transformed into physical capital. This increase is translated

into a decrease in capital returns, an increase in both formal and informal wages and an increase in labor demand.

Despite the distance between simulated and observed outcome, the results that we obtained are in accordance with other related works. In any case, this model shows that a substantial proportion of the economic evolution of the period 1994-1998 in Argentina can be explained by the Pension Reform. Part of the growth, labor demand and capital accumulation was due to this significant reform.

Nevertheless, it is not less true that this reform, including all the effects that increased transition costs (including the reduction in collected SS Taxes), had systematically contributed to increase public debt, in an evolution that ended in the 2001-2002 crisis.

Finally, as we mentioned before, our analysis did not take into account dynamic aspects that are present in this kind of reforms: capital accumulation and viability of reform. Undoubtedly, these matters deserve further attention and will be undertaken in further research.

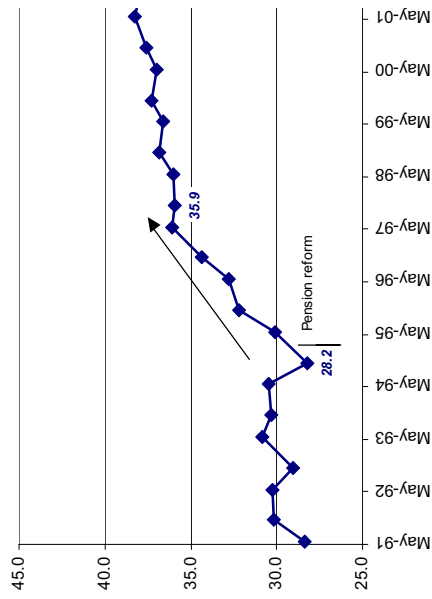
References

- [1] Annabi, Nabil. “*Modeling Labor Markets in CGE Models: Engogenous Labor Supply, Unions and Efficiency Wages*”, CIRPEE Working Paper. **2003**
- [2] Bassanini Andrea, Jorn Henrik and Stefano Scarpetta. “*The Economic Effects of Employment-Conditional Income Support Schemes for the Low-Paid: An Illustration from a CGE Model Applied to Four OECD countries*”, OECD Economics Department Working Papers, Nr. 224. **1999**
- [3] Bourguignon, Francois. “*The pace of Economic Growth and Poverty Reduction.*” Paper presented in LACEA 2001, **2001**.
- [4] Bourguignon, Francois, Anne-Sophie Robilliard and Sherman Robinson. “*Crisis and Income Distribution: A Micro-Macro Model for Indonesia.*” **2001**.
- [5] Bourguignon, Francois, Anne-Sophie Robilliard and Sherman Robinson. “*Representative versus real households in the macro-economic modeling of inequality*”. Paper prepared for the Conference on Frontiers in Applied General Equilibrium Modeling, New Haven, Yale University, **2002**.
- [6] Corbo, Vitorio and Klaus Schmidt-Hebel. “*Efectos macroeconomicos de la reforma de pensiones en Chile.*” **2003**.
- [7] De Ferranti, David, Guillermo Perry, Indermit Gill and Luis Servn. “*Securing our future in a Global Economy.*” World Bank Latin American and Caribbean Studies, **2000**.
- [8] Diamond, Peter A. “*Issues in Privatizing Social Security.*” MIT press, Cambridge Massachusetts, **2000**.
- [9] Edwards, S. and A. Edwards. “*Social security privatization reform and labor markets: The case of Chile.*” NBER Working Paper 8924, **2002**.

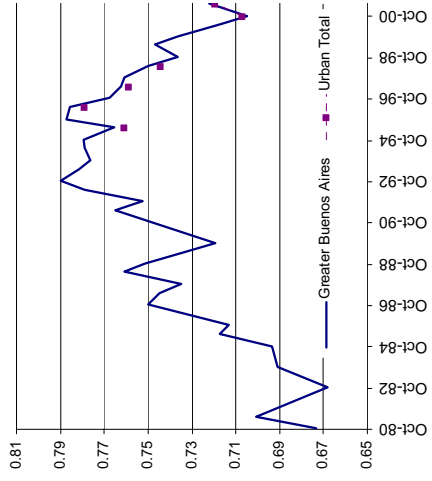
- [10] Garro, N., Meléndez, J., and E. Rodríguez Oreggia. “*Un modelo del mercado laboral mexicano con trabajo con o sin seguro social (IMSS)*”. Inter-American Conference on Social Security, **2002**.
- [11] Harris, John and Michael Todaro. “*Migration, Unemployment and Development: A Two-Sector Analysis*”. American Economic Review 60, **1970**.
- [12] Kotlikoff, Smetters and Walliser. “*Finding a way out of America’s demographic dilemma.*”, NBER Working Paper 8258. **2001**.
- [13] Lewis, W. “*Economic Development with Unlimited Supply of Labor.*” Manchester School, 22 : 139-191, **1954**.
- [14] Lofgren, Hans, Rebecca Lee Harris and Sherman Robinson. “*A Standard Computable General Equilibrium Model in GAMS.*” International Food Policy Research Institute, **2002**.
- [15] Petri, Gerardo Luis and Maximiliano Mendez Parra, “*The 2000 Social Accounting Matrix for Argentina*”, mimeo, **2005** .
- [16] Pizzati, Lodovico and Stefano Scapetta. “*Product and Labor Market Reform in an Economy with Rents, bargaining and Informality.*” unpublished manuscript, **2005**.
- [17] Terra, Maria Inés and Marisa Bucheli. “*The Effects of Increasing Openness and Intergration to the MERCOSUR on the Uruguayan Labor Market: A CGE modeling analysis*”, PEP Working Paper, **2004**.
- [18] Valdés-Prieto. “*Social Security Coverage in Chile, 1990-2001.*” Background paper for regional study on social security reform. World Bank, Latin America and Caribbean Studies, **2002**.

Lack of coverage of Social Security system

Informality rate among wage earners

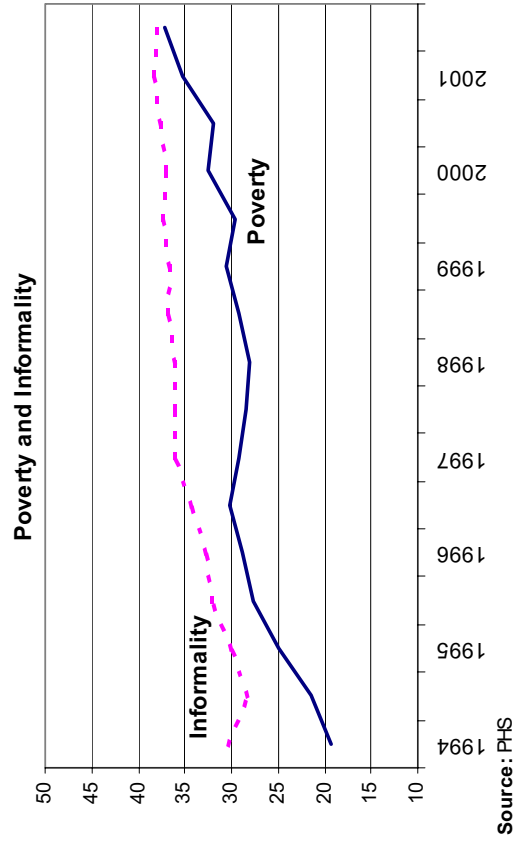


Retired covered by pension system



Source: PHS

Percentage of people with more than 65 years old with pension benefits. Source: PHS



A Model characteristics: Labor markets

Our model is based on a standard computable general equilibrium model for an open economy, to which several changes were introduced. We will focus on these differences, stressing the importance of some particular equations.

The main changes, schematically, are the following:

- we introduce two different labor markets, characterized by **formal and informal labor**. The formal sector is covered by social security and pays Social Security taxes. These taxes are paid both by firms and workers as a payroll tax. Relative demand of each labor input varies between sectors.
- Labor supply is endogenous, allowing unemployment to increase. Formal sector equilibrium is determined by efficiency wages, which depend on unemployment rate.
- Formal and informal relative supply of labor is related to a Harris-Todaro relationship of segmented labor markets. Again, unemployment rate helps to determine this equilibrium.

In the following paragraphs, the issues about labor market are explained with more detail.

Efficiency Wages: Paying a wage premium in order to avoid shrinking is a widely used framework for non-competitive wage determination. The introduction in our model is based on the work of Annabi (2003), particularly on the Shapiro and Stiglitz (1984) application. The no shrinking condition on this model implies that efficiency wages in equilibrium satisfies the following equation:

$$w_f = ee + \left(\frac{ee}{qq}\right)\left(\frac{bb}{un} + rr\right) \quad (1)$$

in which ee is the effort disutility, bb is the exogenous probability of being fired,

qq is the probability of monitoring and detecting shrinking, un is the (endogenous) unemployment rate and rr is a discount rate.

This equation states that efficiency wages must cover the disutility of effort plus an additional amount. This additional is higher the lower is the shrinking detection (when monitoring is difficult, incentives should be stronger), the higher is the probability of being fired (future payments are uncertain), the higher is discount rate (future payments are less valuable) and the lower is unemployment rate (i.e. the higher is unemployment utility).

In our model, the only endogenous variable is unemployment rate, given that all other determinants of efficiency wages are hold fixed. It should be noted that efficiency wages are applied only to formal contracts. Several justifications can support this decision. Firstly, only in formal contracts efficiency wages can be implemented as a commitment; in informal relationships wages are flexible and future payments are not secured. Secondly, informal sector, without adjustment costs, is frequently used as a buffer to face *transitory* demand shocks, while formal jobs are adjusted after *permanent* shocks. Thus, formal jobs are related to specific human capital, valuable to the firm, that can be preserved at a relative low cost, given the low firing and the commitment about future wages.

Formal and informal labor equilibrium:In the efficiency wage model, formal jobs enjoy high job security, are monitored and paid efficiency wages; informal jobs are paid competitive wages and have neither security nor adjustment costs. This situation generates a labor market segmentation in which getting a formal job is preferable than being an informal worker. Unemployment, thus, is a characteristic of formal sector (what justifies the introduction of unemployment in the formal efficiency wage equation). The Harris-Todaro model of urban-rural labor market segmentation can be adapted to this framework. The HT equation,

$$w_r = w_u \frac{LD_u}{LD_u + UN} \quad (2)$$

shows that rural wages (w_r) depend on the expected wage in urban sector, that is determined as the wage rate (w_u) times the probability of getting a urban job. This probability is calculated as the proportion of jobs over total urban labor supply, considering that unemployed are seeking for urban jobs. This equation can be adapted to formal and informal sectors/jobs. The equation can be converted to:

$$w_i = w_f \frac{LD_f}{LS} \quad (3)$$

that states that informal wages equal the expected wage of formal sector, considering that all labor supply prefer and seek formal jobs. This equation, considering that labor demand equals labor supply in each segment, is added to our model as:

$$LSF_h = \left(\frac{LSF_h + LSI_h}{1 - un} \right) (1 + htpar_h) \frac{w_i}{w_f} \quad (4)$$

This notation implies that HT equation must be satisfied by each representative household. Furthermore, given that informality differs among households, a parameter ($tpar_h$) was introduced, in order to maintain that difference. This parameter can be considered as a non explicit form of social security valuation: formal-informal wage gap depends on labor market segmentation and on the valuation among workers of social security benefits. If these benefits are more relevant to workers, informal wages should increase in order to compensate the disutility of lacking social security.

Labor supply: Labor supply was introduced following Annabi (2003). The model lays on two restrictions to variables: a maximum level of labor supply (thus, a minimum level of leisure) and a minimum level of consumption. Following Annabi (2003), labor supply is determined by the following equation:

$$\left(\frac{LSF_h + LSI_h}{1 - un}\right) = MAXHOUR_h - \left(\frac{ZETA}{(1 - zeta)w}\right)(CTH_h - \sum_j CMIN_{j,h}PC_j) \quad (5)$$

This equation is defined for each representative household, while w represents the mean wage rate.

B Model Characteristics: Capital markets and Government

Social Security reform simulation demanded to change several closures of the model, particularly in capital market and in government accounts. Capital supply is exogenous and it is freely mobile across sectors. Nevertheless, the Social Security Reform collects pension funds that are invested in physical capital in a given proportion. This proportion is determined by two other allocations of these funds: public debt and fund fees. Thus, the proportion that is invested in physical capital is exogenously determined by the model by the parameter $taop$. The increase in physical capital is considered to be the perpetuity of annual funds, discounted at a rate rrr . In other words, long term impact is assessed. Thus, the capital supply equation is:

$$KS_i = KSO + \frac{(taop) \sum_i SSTFC_i}{rrr} \quad (6)$$

Pension reform reallocates a significant proportion of government income, that is transferred to private accounts. This introduces a significant deficit in social security system. This transition costs can be financed by higher taxes or by public debt. To introduce these aspects in the model, government closure was changed. In fact, the government increases VAT rate in order to cover financial needs. Additionally, government can make use of a proportion of pension funds to finance transition costs,

through public debt. Both sources of financing should maintain current government savings fixed. In other words, transition costs should not affect final result of government accounts. Two special characteristics are relevant for the case of Argentina:

- The increase in tax collection is focused on VAT, coherently with the adjustment in Argentina.
- The proportion of Social Security taxes that is converted in public debt is an exogenous parameter that reflects government regulations to pension funds.

This closure of the government has evident drawbacks. Improvement of this aspect would contemplate government debt financial costs, limits to debt stock and an increase in interest rate when debt increases.

C Social Accounting Matrix (SAM) for Argentina

The Argentine SAM is based on the desegregation of the sectors of the 1997 Argentina's Input-Output Tables (MIPA-97) built by INDEC. We modify the SAM built by the Secretariat of Agriculture, Livestock, Farming, Fisheries and Food, henceforth SALF-SAM.¹⁹, which updates the 1997 data up to year 2000. The SAM is based on an Input- Output table had a detailed breakdown of the agricultural sector (47 categories) and a total of 64 sectors. We proceed to a brief description of the basic structure of the SALF-SAM.

C.1 Production factors:

The production factors included in the SALF-SAM are labor, land and capital. All factors are considered homogeneous. Labor demand was estimated using the MIPA

¹⁹Gerardo Luis Petri and Maximiliano Mendez Parra, "The 2000 Social Accounting Matrix for Argentina"

97, the Permanent Household Survey (EPH-INDEC) and the cost product structures. Average wages are obtained from the MIPA 97.

C.2 Households

Household consumption is drawn from the National Expenditure Survey (1996-1997).

C.3 Firms

It is assumed that firms are homogeneous and they receive all the capital payment, i.e. there is no payment between factors. Households receive payment from labor and firms receive payment from capital and then they made payments to households. Capital payments are computed as the residual part from the value added after payment to labor (gross production surplus).

C.4 Government

Government consists of the national, provincial and city governments. Data fro government investment was provided by DNIP²⁰ and expenditures from DNGC²¹.

In order to compute national taxes, tariffs and social security payments, information from the AFIP²². At the provincial and city level, data from DNGC were used.

C.5 Saving Investment

Data from the DNCN²³ and DNCPM²⁴ were used.

²⁰Dirección Nacional de Inversión Pública

²¹Dirección Nacional de Gasto Consolidado

²²National Revenue Agency

²³National Accounts Office

²⁴Macroeconomic Programming Office

C.6 Rest of the world

Countries were grouped in seven: Brazil, Mexico, Canada, United States, European Union, Rest of Latin America and Rest of the World. All the trade data was provided by the Argentine Customs Office.

C.7 Final balancing

The SAM was not properly balanced, because the differences in the valuation of magnitudes from supply and demand. The approach used to balance the matrix is the one developed by Robinson and El-Said (2000), known as the cross entropy method.²⁵

C.8 Update to 2000

The SAM was built on data from 1997, but an update to 2000 was made. This year was the last of “normal” economic activity for Argentina before the crisis of 2001. In order to do this update, gross value of production and supply and demand by sector data was obtained from the DNCN.

The updating process consisted on using the technical coefficient from the SAM 1997 and applying to the row and columns total values from 2000. In this way, a SAM with final values for 2000 was obtained, but keeping the relatives prices structure and technology from 1997.

D Modifying the SAM

For the sake of this work, we aggregate back all agricultural breakdowns and make specific modification to the household income-expenditure structure which we will specify below.

²⁵For a more detailed analysis see Petri et al. (2005)

D.1 Household Income and Expenditures

D.1.1 Household Survey:

The household survey for May 2000 (Encuesta Permanente de Hogares) was used to calculate the sources of income and the structure of the four representative households.

The following income sources appear in the Household Survey:

1. Monthly labor income (wages)

- Salaried workers ordinary wage
- Salaried workers benefits
- Self Employed
- Company owner
- Retrieve production for home consumption
- Other non monetary payments (coupons, etc.)

2. Non-labor income

- Pensions
- Rents/Interests
- Benefits/utilities
- Unemployment benefits
- Severance payments
- Scholarships
- Alimony
- Transfers from people outside the household
- Others

We also used the information available in the Household Survey in order to characterize the household supply of labor.

D.1.2 Expenditure Survey:

We used the Expenditure Survey in order to build the consumption of each representative household. Expenditure information available for Argentina is relatively poor compared to that of income. The last expenditure survey is available for 1996-1997. We updated this information to year 2000 using the Consumer price index for each item we mention below.

1. Expenditures on food and beverages
2. Expenditures on clothing and footage
3. Expenditures in the home:
 - Buy/ Sell of real state
 - Rents
 - Oil, water services, electricity and taxes
 - Construction and repairs
 - Other expenditures
4. Home Equipment
 - Home utensils and maintenance
 - Furniture and household appliances
 - Curtains, rugs, decorative ornaments
 - Household cleaning products
 - Maids/Domestic Service

5. Health Expenditure

- Medicine
- Medical Equipment
- Health Services
- Hospitalization

6. Transport and Communications

- Purchase/sale of vehicles
- Oil, fuel, etc.
- Car repairs, accessories
- Car tolls and licensing
- Transport passes
- Daily expenditure in urban transportation
- Mail and phone coins
- Telephone line

7. Entertaining expenditures

- Trips/Tourism
- Equipment and services for movies and video
- Audio equipment
- Sport equipment, toys and repairs
- Books, newspapers and magazines

8. Educational expenditures

- Educational Services and books

- Educational material for Basic studies

9. Other goods and services

- Cigarettes, tobacco and toiletry
- Other services for personal care
- Other goods
- Other services

10. Payments in installments, credit card debt, etc

D.1.3 Price Index

In order to update the ENGH up to 2000, disaggregated CPI were used. CPI is disaggregated in the following sectors:

- food and beverage
- clothing, housing and basic services
- home equipment and maintenance
- health care
- transport, communications and entertaining
- education
- other goods and services