Morocco and the US Free Trade Agreement: Rural Wages, Energy Imports, and Unemployment

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The impact of the US Free Trade Agreement in Morocco is examined in a general equilibrium production model. Price changes in eight sectors lead to adjustments in rural wages, urban wages, imported energy input, and outputs. Okun's law as the link between national income and unemployment leads to adjustment in the unemployment rate. Sensitivity to price changes and input substitution is examined, and substantial adjustments occur under reasonable price scenarios. The relative rural wage falls while the effect on unemployment depends on price changes.

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A comparative static production model is applied to anticipate adjustments in Morocco to its US Free Trade Agreement focusing on income redistribution between rural and urban labor, structural unemployment, and energy imports. This FTA provides for bilateral tariff elimination on many agricultural products and phases out most other tariffs over 15 years. Morocco's trade with the US will increase relative to its major trading partner, the EU.

About half the labor in Morocco is rural and the model separates the effects on rural and urban wages. High urban unemployment in Morocco motivates the application of Okun's (1962) law linking unemployment to national income. Thompson (1989) develops the theoretical application of Okun's law in a general equilibrium model of production and this paper is its first such application.

Substantial redistribution is predicted for capital inputs across eight major industries for a wide range of price changes and different degrees of substitution. Energy imports adjust given the exogenous international price of energy.

Morocco has been preparing for the FTA and integrating into the global economy with privatization, reduced government spending, eased business regulations, and open foreign investment (USITC, 2004). Morocco has also lowered its high import protection as discussed by Alonso-Gamo, Fennell, and Sakr (1997). Economic reform has been successful relative to other countries in the region according to Page and Underwood (1997).

Brown, Kiyota, and Stern (2005) predict small employment changes in Morocco with the Michigan Model of World Production and Trade. The present model, however, shows the direction and size of the unemployment effect depends on changes across output prices. The benefits of rising prices accrue primarily to export industries and tourism, while there will be increased import competition for

agriculture and some manufacturing industries. Gilbert (1999) predicts the effects of the FTA on the US will be negligible.

Sensitivity to FTA price changes is examined with four price change scenarios: moderate, strong, polarized, and agricultural subsidies. Sensitivity to different degrees of constant elasticity of substitution and sensitivity to the strength of Okun's law are examined.

The first section presents some background on Morocco, followed by sections on the data, model, and comparative static elasticities of price changes. Sections then cover projected FTA price changes and the projected economic adjustments in the model.

1. Some background on Morocco

The World Bank ranks Morocco as a middle income developing country with a real income per capita of $4300 in 2005. Morocco's total land area according to the *CIA World Factbook* (2008) is slightly larger than California and its population of 34 million nearly that of California. The World Phosphate Institute ranks Morocco as is the world's leading exporter of phosphates with about two-thirds of the world's reserves and the third largest producer following the US and Russia.

The Economic Intelligence Unit (2003) country report reports that the labor force is evenly distributed between rural and urban with urban services accounting for half of GDP. The majority of service exports are tourism, the second source of foreign currency after remittances from abroad. The economy is fairly diversified with agriculture playing a central role. Labor intensive agriculture contributes 22% to GDP and employs 40% of the labor force. Agricultural products account for 30% of exports and 20% of imports. Manufacturing employs 15% of the labor force and contributes 36% to GDP.

Most of Morocco's economic and trade ties are with the EU due to proximity and historical ties to Spain and France. The EU accounts for three quarters of exports and half of imports (UN Trade Statistics, 2003). France, Portugal, and Spain are the largest foreign investors accounting for over 90%

of foreign direct investment in 2001. In 2005 Morocco had a trade deficit of $8 billion with a trade index (X+M)/GDP of 52%. Exports are led by manufacturing, fish, and chemicals, and imports by computers, fabrics, and petroleum as in Table 1.

* Table 1 *

Almost 5% of imports came from the US while just over 3% of exports were shipped to the US. Leading US exports to Morocco are aircraft, soybeans, corn, and wheat. In 2003 the US recorded a $66 million trade surplus with Morocco. Galal and Lawrence (2003) argue that the US does not appear to be an ideal partner for a free trade agreement with Morocco given Morocco's economic characteristics and its relationship with the US.

Morocco can be roughly divided into rural agriculture and a diversified urban economy. In 2004 urban unemployment stood at 18% and rural wages are low. Employment in kind represents over half of rural income according to Löfgren (1999) and skilled workers earn six times the unskilled wage as noted by Karshenas (1994). The present model splits labor into urban and rural, and focuses on structural unemployment.

2. Production data for Morocco

The total payment matrix for 2005 in Table 2 is from *Haut Commissariat au Plan: Direction de la Statistique*. Value added for 20 industries in millions of Dirhams (Dirham Dh, $1 = Dh9) is from *Comptes De La Nation: valeur ajoutées par branche.* Employment data by skill in rural R and urban U areas is from *Indicateurs d'activité et de chômage*.

These sources provide data for eight industries,

A	Agriculture	T	Textiles, Leather, Shoes
F	Fisheries	C	Construction, Real Estate
P	Mining	H	Hotels, Restaurants
M	Manufacturing	S	Services

and four inputs

U	Urban Labor	R	Rural Labor
K	Capital	E	Energy.

Labor and imported energy are assumed to be mobile across industries. Assume each industry has its own specific capital to focus on the fortune of capital across industries. Some capital machinery, equipment, and structures can be used in various industries while other types are industry specific. Specialized capital could be sold to other countries and ultimately the investment could be moved into other industries. The present assumption of industry specific capital captures short or intermediate time spans, perhaps from 1 year up to 5 or 10 years.

* Table 2 *

Factor shares θ_{ij} in Table 3 are portions of value added for factor i in industry j and rows sum to one. For example, value added in agriculture A is Dh209 billion from Table 1 and the rural labor R factor share is 123/209 = 59%. Agriculture employs little energy E or urban labor U. Capital K_j has the largest factor share in mining P, manufacturing M, and hotels H. Urban labor U has the largest factor share in fisheries F, textiles T, and construction C. Energy E has the largest factor share in services S. The 8x11 factor share matrix θ has zeroes for other industry capital shares.

* Table 3 *

Table 3 also reports intensities of energy relative to capital E/K and rural relative labor to urban labor R/U. Relative to capital, services is very energy intensive but that is due to its low capital input. Fisheries, mining, and manufacturing are more energy intensive than construction, hotels, and textiles, and agriculture is by far the least energy intensive activity. Rural labor is extremely intensive in agriculture, followed distantly by textiles, manufacturing, and fisheries.

Industry shares in Table 4 show the distribution of factors across industries. Summing down a column in Table 2 gives factor income. Assuming equal factor prices across industries, industry shares are derived. For example, the total income of rural labor R in all industries is Dh194 billion and its

industry share in agriculture A is 123/194 = 63%. Note that 37% of urban workers U are employed in services S followed by 23% in textiles and 16% in manufacturing M. Energy E is mostly used in the same two industries, 64% in services and 14% in manufacturing. Column K indicates how the total capital stock is distributed with manufacturing M, services S, and agriculture A accounting for 80% of the total capital stock. The 8x11 industry share matrix λ has zeroes for other industry capital.

* Table 4 *

3. The model of production with Okun's Law

The model assumes constant returns, competitive pricing, and cost minimization as developed by Jones and Scheinkman (1977), Chang (1979), and Thompson (1995). Labor is employed subject to Okun's law as a structural negative relationship between the unemployment rate and national income as in Thompson (1989).

Substitution elasticities developed by Jones (1965) and Takayama (1982) summarize how cost minimizing inputs adjust to factor price changes. Following Allen (1938) the cross price elasticity between the input of factor i and the payment to factor k in industry j is

$$E_{ik}^{j} = \hat{a}_{ij}/\hat{w}_k = \theta_{kj}S_{ih}^{j}, \qquad (1)$$

where S_{ih}^{j} is the Allen partial elasticity of substitution. With Cobb-Douglas production $S_{ih}^{j} = 1$ and constant elasticity of substitution CES production implies a scaled positive Allen elasticity. Given linear homogeneity $\Sigma_k E_{ik}^{j} = 0$. The own price elasticity E_{ii}^{j} is the negative sum of cross price elasticities.

Substitution elasticities are the weighted average of cross price elasticities,

$$\sigma_{ik} = \hat{a}/\hat{w}_k = \Sigma_j \lambda_{ij} E_{ik}^{j} = \Sigma_j \lambda_{ij}\theta_{kj}S_{ih}^{j}. \qquad (2)$$

Factor and industry shares are sufficient to derive the Cobb-Douglas substitution elasticities in Table 5 and CES scales accordingly. The 11x11 matrix σ of substitution elasticities enters the comparative static system below.

* Table 5 *

The largest own price elasticity is -1.76 for energy E and the smallest is -0.38 for textiles capital K_T. Every 1% increase in the price of energy e lowers its input 1.76% indicating substantial price sensitivity. Energy and both labors have larger own elasticities than capital. There is slightly more substitution with respect to the urban wage w_U than the rural wage w_R with an average across other inputs of 0.36 compared to 0.21. Factors are generally weak substitutes consistent with estimated cross price elasticities in the literature. CES scales the substitution elasticities in Table 5 and sensitivity to CES is discussed.

Okun's law is stated $du = \alpha dY$ where u is the unemployment rate and Y is national income as the sum of factor payments, $Y = w_U N + w_R L_R + eE + \Sigma_j r_j K_j$. The number of employed urban workers N is derived from the exogenous urban labor force L_U and the endogenous unemployment rate according to $N = (1 - u)L_U$ implying $dN = (1 - u)dL_U - L_U du$. National income then changes according to $dY = Ndw_U + L_R dw_R + Ede + \Sigma_j K_j dr_j + w_U dN + w_R dL_R + edE + \Sigma_j r_j dK_j$.

The first equation of the comparative static system below is derived from the employment of urban labor L and includes structural unemployment. The second equation is full employment of rural labor R. The third equation is an input condition for energy E with the exogenous international price of energy e in the right hand exogenous vector. There are 8 employment equations for industry capital inputs. Competitive pricing is the next set of 8 equations across industries. The last two equations define national income Y and link Y to the unemployment rate u.

The comparative static system with exogenous variables on the right is written as

$$\begin{pmatrix} & & & & & \\ & \sigma_{11x11} & \lambda'_{11x8} & 0 & L & \\ & \theta'_{8x11} & 0_{8x1} & 0_{18x1} & 0_{18x1} & \\ -N & -L_R & -e & -K_{j1x8} & 0_{1x8} & w_U L \end{pmatrix} \begin{pmatrix} dw_U \\ dw_R \\ dE \\ dr_{j\ 8x1} \\ dx_{j\ 8x1} \\ dY \end{pmatrix} = \begin{pmatrix} (1\text{-}u)dL - s_{UE}de \\ dL_R - s_{RE}de \\ s_{EE}de \\ dK_{j8x1} - s_{Ej}de \\ dp_{j8x1} \\ (1\text{-}u)w_U L + w_R L_R + \Sigma_j r_j dK_j + Ede \end{pmatrix}$$

$$0 \quad 0 \quad 0 \quad 0_{1x8} \quad -\alpha \quad 1 \quad du \qquad\qquad 0 \qquad .$$

Partial derivatives of each of the 21 endogenous variables (w_U w_R E r_j x_j Y u) with respect to the 19 exogenous variables (U R e K_j p_j) are found inverting the system matrix.

The parameter $\alpha = du/dY$ of Okun's law is scaled to 2003, a year of economic liberalization when the number of unemployed declined by 30,000 (over 2%) and total income increased by Dh45.89 billion (over 6%). The implied elasticity of unemployment with respect to income is $\alpha = -0.425$. The present simulations then assume every 1% increase in income would lower unemployment by 0.425 percentage points. Okun coefficient estimates in the literature vary from -0.1 to beyond -2.0 but adjustments in the present model are insensitive to α.

4. Comparative static elasticities in the model

Table 6 reports the comparative static elasticities of factor prices with respect to changes in product prices. The effects are uneven in that with any price change some factor prices rise while others fall. Every 1% decrease in agricultural prices p_A would lower rural wages w_R by 0.27% and the payment to capital (including land) in agriculture r_A by 2.41%, a potentially large impact. Rural wages w_R also have fairly strong positive links with prices in services p_S and textiles p_T.

* Table 6 *

Table 7 reports price elasticities of outputs along the surface of the production frontier. A higher price raises that industry output, attracting labor and energy from other industries where outputs generally fall. The only exception to this pattern is for agriculture output x_A that increases with prices in fisheries p_F, mining p_P, and hotels p_H. Every 1% decrease in the price of agriculture lowers its output by 1.41%. The largest own output effects are in textiles x_T at 2.72% and services x_S at 2.03%.

* Table 7 *

Table 7 includes elasticities of energy input E with respect to prices. Energy is assumed to be an imported input that is mobile between industries. Energy imports fall weakly with higher prices for

mining p_P, construction p_C, and hotels p_H but rise considerably with higher prices for agriculture p_A and services p_S. The largest effect on E is for the price of services p_S where every 1% increase in leads to a 0.49% increase in E input. Higher prices in mining p_P, construction p_C, and hotels p_H slightly lower energy input, perhaps a surprise but these industries have small energy shares and attract labor to expand.

5. Projected price change scenarios

Base tariff rates in Morocco typically reach 50% ad valorem while tariff rate quota (TRQ) products and other sensitive agricultural imports have effective rates over 300%. Morocco will eliminate duties on many US imports immediately and phase out duties on some agricultural imports including TRQs and sensitive industrial products over a period up to 25 years.

The average tariff rate for US products entering Morocco is over 20%. Gilbert (1999) estimates the FTA will increase US exports to Morocco by 88% and Shapouri and Rosen (2003) note that Moroccan imports of all grains can be expected to increase. Abdelmalki, Sandretto, and Sadni-Jallab (2007) point out that the gains to consumers in terms of lower prices may be offset by lost government tariff revenue, lower trade with third parties, and deteriorating terms of trade with the US.

Agricultural prices are expected to fall as trade barriers are eliminated and domestic producers face increased competition, especially for highly protected wheat. Abdelmalki, Sandretto, and Sadni-Jallab (2007) consider high quality and low cost US agricultural products (partly due to subsidies) a serious threat agriculture in Morocco. The USDA reports average tariffs from 1998 to 2003 were 18% on corn, 28% on durum wheat, and 83% on bread wheat. For simulation, the price of agriculture is projected to fall 10% and 20% as well as 0% in a simulation that assumes government subsidies keep it constant.

The ocean off Morocco's Atlantic coast is a rich fishing ground and fishing has been a major industry since the 1930s. The present simulations assume Morocco will remain an exporter and that

demand for exported fish will rise with the FTA. The price of fish p_F is assumed to rise 5% or 10% in the simulations consistent with increased export demand.

The mining industry is also expected to gain from the FTA and the increase in p_P is assumed to be 5% or 10%. Mining plays a large role in the economy and this price increase should have some weight on the outcome. The same range of price changes is examined for construction p_C, hotels p_H, and services p_S.

The manufacturing price is much more difficult to predict due to ambiguity in the changing product mix. The effects of 5%, 0%, and -5% changes in p_M are examined. There is also some ambiguity for the outcome in textiles and p_T price changes of 0% and -5% are simulated.

Four sets of price changes are simulated in Table 8. Moderate price scenario M has the price in agriculture p_A falling by 10%, the price of textiles p_T constant, and other prices increasing by 5%. Strong price scenario S has the price of agriculture p_A falling by 20% and prices of manufacturing p_M and textiles p_T falling by 5% while other prices rise by 5%. Polarized scenario P has the agriculture price p_T falling by 20% and other prices rising by 10% but no changes in prices of manufacturing p_M or textiles p_T. Agricultural scenario A assumes subsidies maintain the price in agriculture p_A with other price changes set to moderate scenario M.

* Table 8 *

6. Economic adjustments in Morocco to FTA prices

The adjustments in rural and urban wages, energy imports, outputs, capital returns, national income, and the unemployment rate to the four FTA price scenarios are also in Table 8. To arrive at factor price adjustments, the vector of predicted price changes is multiplied by the matrix of factor price elasticities in Table 6.

In moderate scenario M the rural wage w_R decreases by -2% while the urban wage w_U increases by 5%. In contrast, the capital return in agriculture r_A falls by -27% with the largest capital return

increase in services r_S at 14%. Capital return effects are larger than price changes, an example of the magnification effect of Jones (1965). Compared to the capital return adjustments, labor mobility mitigates wage adjustments. Income falls by -3% and the unemployment rate u rises by 1 percentage point.

Output adjustments are found multiplying a vector of predicted price changes by the matrix of price elasticities in Table 7. Industries where the return to capital decreases also lower output. In moderate scenario M agriculture output x_A suffers the largest decline by far at -17%. The only other industry suffering a decline is textiles with a decrease of -9% in x_T. The services industry is the biggest winner with output x_S rising by 9%. The decline in energy input E of -1% is associated with declining agricultural output. National income defined as the income of domestic factors falls by -3% and the unemployment rate u rises by 1 point.

Strong scenario S indicates a 20% reduction in the price of agriculture p_A coupled with decreases of -5% in the prices of manufacturing p_M and textiles p_T. The capital return in agriculture r_A falls by -49%, output x_A falls by -29%, and the rural wage w_R falls by -5%. Outputs and capital returns in manufacturing and textiles fall considerably but other industries expand and prosper. Income rises by 19% and unemployment falls by 8 points, a very strong Okun effect. Energy input falls by -5%.

The polarized scenario P results in stronger adjustments. The urban wage w_U rises by 9%, income Y rises by 1%, and unemployment u falls by 1 point. Even with no change in manufacturing and textiles, these industries lose due to the rising prices in other industries. Energy input falls by -2%.

The agricultural subsidy in scenario A rescues agriculture although its output x_A and the return to capital r_A both fall by -2%. The rural wage w_R rises by 1%, the only scenario in which it does not fall. Income Y falls by -8% and unemployment u rises by 4 points, the worst outcome for the aggregate economy. Energy input E increases by 3%. The textile industry suffers even though its price does not fall. Galal and Lawrence (2003) point out that highly restrictive rules of origin referred to as "fiber-

forward" rules would force Moroccan clothing manufacturers to use high cost domestic or US inputs lowering export competitiveness. Effects on other industries are smaller than in scenario M when labor does not leave agriculture to such an extent.

The present results indicate that the unemployment rate u may rise or fall depending on the magnitude of price changes. Decreases in the unemployment rate u are predicted in the strong price scenario S and polar price scenario P. Increases in u occur in the moderate scenario M and the agriculture subsidy scenario A.

The relative rural wage w_R/w_U falls in every scenario, by as much as -12% in the polar scenario P to as little as -4% with the agricultural subsidy in scenario A. The effect of the FTA on income inequality in Morocco will be substantial. In such a model with various inputs, trade might polarize wages of different labor types within a country and Thompson (1986) shows wages of the same labor type may polarize between countries.

The present projections are consistent with Helpman, Itskhoki, and Redding (2008) who develop a model with labor market frictions in which trade can increase the wage gap and unemployment. Also, Goldberg and Pavenik (2007) document evidence that trade has raised the wage gap between skilled and unskilled labor across a number of developing countries.

Regarding sensitivity to substitution, estimates of substitution elasticities in the literature range from 0.5 to over 1.0. With a CES elasticity of 0.5 the factor price elasticities in Table 6 are identical while the output elasticities in Table 7 are half as large. The property that factor price elasticities are identical for any degree of CES substitution was first noted by Thompson and Toledo (2005). Wage and capital return adjustments in Table 8 are identical as are energy input adjustments. Output adjustments are about half as large. National income adjustments are about half as large in absolute value, as are unemployment adjustments.

Adjustments in Table 8 scale to monotonic changes in the price change vector. For instance, doubling a price vector doubles all adjustments. The model is robust to a wide range of values for the Okun coefficient α. With $\alpha = -2.0$ the only noticeable differences are somewhat smaller effects on income y adjusting across scenarios M, S, P, A by -1%, 3%, 0%, -2%. The reader can readily simulate other vectors of price changes in the model.

Adjustments in outputs are generally modest relative to capital returns but altered investment would generate larger long run output adjustments. Assume a unit elasticity of the capital stock with respect to its return. The percentage long run adjustment in output is about equal to the percentage change in an industrial capital stock. Output will then further decline in the contracting industries and increase in expanding industries as the economy becomes more specialized. In moderate scenario M for instance, the decline in agricultural output x_A increases from -17% to -27% in the long run.

7. Conclusion

The present small scale simulation illustrates how the specific factors model of production and trade can be tailored to a particular situation. The present application with rural and urban wages, unemployment, and energy imports provides insight into the pending adjustments as Morocco implements its Free Trade Agreement with the US.

Moroccan export industries (fisheries, mining, services) will benefit while import competing industries (manufacturing, textiles, and especially agriculture) will suffer increased competition and falling prices. The rural wage will fall unless agriculture is subsidized while the urban wage will rise. Energy imports will fall unless agriculture is subsidized. Subsidizing agriculture appears very costly for the aggregate economy in terms of income and unemployment. The change in national income depends on price changes, making the effect on unemployment through Okun's law ambiguous. Effects on specific capital returns vary across industries. Output adjustments are moderate but much larger as investment pursues higher capital returns.

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Table 1. Moroccan Trade Commodities

Exports	$mil	Imports	$mil
Apparel & footwear	2,616	Computers	3,576
Fish & shellfish	918	Yarn & fabric	1,483
Electronics	883	Petroleum	1,386
Inorganic chemicals	471	Machinery	906
Phosphates	364	Cereals	749
Fertilizer	332	Motor vehicles	582
Petroleum	286	Medicines	181

Table 2. Total Factor Payments

Dh bil	$Capital_j$	Energy	Urban	Rural	Total
Agriculture	72.5	3.7	10.1	123	209
Fisheries	15.5	11.6	17.1	4.5	48.8
Mining	4.2	2.7	3.8	0.9	11.6
Manufacturing	142	25.9	70.2	25.3	263
Textiles	22.9	14.9	49.7	15.7	103
Construction	31.1	8.4	38.2	6.2	83.8
Hotels	6.5	1.6	4.6	0.6	13.3
Services	92.9	122	115	18.1	348
Total	388	191	309	194	1,082

Table 3. Factor Shares θ_{ij} and Intensities

	$Capital_j$	Energy	Urban	Rural	E/K	R/U
Agriculture	.35	.02	.05	.59	.06	11
Fisheries	.32	.24	.35	.09	.75	.26
Mining	.36	.24	.33	.08	.67	.22
Manufacturing	.22	.14	.48	.15	.64	.31
Textiles	.54	.10	.27	.10	.19	.37
Construction	.37	.10	.46	.07	.27	.15
Hotels	.49	.12	.34	.05	.24	.15
Services	.27	.35	.33	.05	1.3	.15

Table 4. Industry Shares λ_{ij}

	$Capital_j$	Energy	Urban	Rural
Agriculture	.19	.02	.03	.63
Fisheries	.04	.06	.06	.02
Mining	.01	.01	.01	.00
Manufacturing	.06	.08	.16	.08
Textiles	.37	.14	.23	.13
Construction	.08	.04	.12	.03
Hotels	.02	.01	.01	.00
Services	.24	.64	.37	.09

Table 5. Cobb-Douglas Substitution Elasticities σ_{ik}

factor prices unit inputs	w_U	w_R	e	r_A	r_F	r_P	r_M	r_T	r_C	r_H	r_S
a_U	-1.53	0.54	0.34	0.03	0.04	0.01	0.08	0.10	0.07	0.01	0.23
a_R	0.43	-1.37	0.35	0.26	0.02	0.00	0.07	0.07	0.03	0.00	0.09
a_E	0.64	0.39	-1.76	0.02	0.05	0.01	0.07	0.07	0.04	0.01	0.40
a_A	0.05	0.59	0.02	-0.65	0	0	0	0	0	0	0
a_F	0.35	0.09	0.24	0	-0.68	0	0	0	0	0	0
a_P	0.33	0.08	0.24	0	0	-0.64	0	0	0	0	0
a_M	0.48	0.15	0.14	0	0	0	-0.78	0	0	0	0
a_T	0.22	0.08	0.08	0	0	0	0	-0.38	0	0	0
a_C	0.46	0.07	0.10	0	0	0	0	0	-0.63	0	0
a_H	0.34	0.05	0.12	0	0	0	0	0	0	-0.51	0
a_S	0.32	0.05	0.36	0	0	0	0	0	0	0	-0.73

U Urban R Rural e,E Energy A Agriculture F Fisheries P Mining M Manufacturing T Textiles C Construction H Hotels S Services

Table 6. Price elasticities of factor prices and energy input

prices / factor prices	p_A	p_F	p_P	p_M	p_T	p_C	p_H	p_S
w_U	-0.01	0.26	0.23	0.15	0.27	0.23	0.18	-0.02
w_R	0.27	-0.06	-0.10	0.00	0.22	0.01	-0.08	0.44
r_A	2.41	0.07	0.15	-0.02	-0.42	-0.04	0.12	-0.77
r_F	-0.34	2.86	-0.22	-0.18	-0.41	-0.25	-0.17	-0.48
r_P	-0.29	-0.24	2.60	-0.15	-0.34	-0.21	-0.14	-0.40
r_M	-0.08	-0.09	-0.07	1.57	-0.14	-0.08	-0.05	-0.12
r_T	-0.39	-0.53	-0.42	-0.33	3.72	-0.50	-0.32	-0.58
r_C	-0.14	-0.31	-0.26	-0.18	-0.40	2.41	-0.20	-0.20
r_H	-0.10	-0.18	-0.15	-0.11	-0.23	-0.16	1.92	-0.15
r_S	-0.53	-0.33	-0.24	-0.20	-0.45	-0.27	-0.19	3.03

U Urban R Rural A Agriculture F Fisheries P Mining M Manufacturing T Textiles
C Construction H Hotels S Services

Table 7. Price elasticities of outputs and energy with respect to output prices

prices / outputs, energy	p_A	p_F	p_P	p_M	p_T	p_C	p_H	p_S
x_A	1.41	0.07	0.15	-0.02	-0.42	-0.04	0.12	-0.77
x_F	-0.34	1.86	-0.22	-0.18	-0.41	-0.25	-0.17	-0.48
x_P	-0.29	-0.24	1.60	-0.15	-0.34	-0.21	-0.14	-0.40
x_M	-0.08	-0.09	-0.07	0.57	-0.14	-0.08	-0.05	-0.12
x_T	-0.39	-0.53	-0.42	-0.33	2.72	-0.50	-0.32	-0.58
x_C	-0.14	-0.31	-0.26	-0.18	-0.40	1.41	-0.20	-0.20
x_H	-0.10	-0.18	-0.15	-0.11	-0.23	-0.16	0.92	-0.15
x_S	-0.53	-0.33	-0.24	-0.20	-0.45	-0.27	-0.19	2.03
E	0.36	0.03	-0.01	0.02	0.06	-0.01	-0.01	0.49

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Table 8. Adjustments to FTA price changes

%Δ	M	S	P	A	%Δ	A	B	C	D	%Δ	A	B	C	D
					w_U	5	3	9	5	y	-3	14	1	-8
E	-1	-5	-2	3	w_R	-2	-6	-3	1	u	1pt	-6pt	-1pt	4pt
p_A	-10	-20	-20	0	r_A	-27	-48	-53	-3	x_A	-17	-28	-33	-3
p_F	5	5	10	5	r_F	11	18	24	8	x_F	6	13	14	3
p_P	5	5	10	5	r_P	10	16	22	7	x_P	5	11	12	2
p_M	5	-5	0	5	r_M	7	-8	-2	6	x_M	2	-3	-2	1
p_T	0	-5	0	0	r_T	-10	-21	-16	-13	x_T	-10	-16	-16	-13
p_C	5	5	10	5	r_C	8	13	17	6	x_C	3	8	7	1
p_H	5	5	10	5	r_H	7	10	15	6	x_H	2	5	5	1
p_S	5	5	10	5	r_S	14	24	31	9	x_S	9	19	21	4

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Price scenarios: M Moderate S Strong P Polar A Agriculture Subsidy