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Political Institutions and International Patterns of Agricultural Protection

John C. Beghin
Mylene Kherallah

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NORTH CAROLINA STATE UNIVERSITY
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John C. Beghin
Mylene Kherallah*

*Department of Agricultural and Resource Economics, North Carolina State University.

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ABSTRACT

This paper analyzes the influence of political systems and rights in patterns of agricultural protection across commodities, countries and over time. Four political systems (dictatorship, one-party, dominant party, democracy) and an index of political rights account for differences in political institutions. The analysis also incorporates the effects of development, of constraints on tax collection feasibility, and of comparative advantages and terms of trade. Pluralistic systems are associated with higher agricultural protection levels, although in a nonlinear fashion. Access to pluralism appears to be important, although further democratization (from dominant party system to democracy) does not induce more distortions.

POLITICAL INSTITUTIONS AND INTERNATIONAL PATTERNS OF AGRICULTURAL PROTECTION

"In our hunger for a pattern behind things we entertain fantasies of conspiracies."

John Updike

Bale and Lutz, Honma and Hayami, Krueger, Schiff and Valdès have shown that agriculture in industrialized countries has been strongly protected, while in low-income countries it often has been taxed. In developing economies, the high cost of collective action by farmers together with the pressure from urban consumers and the manufacturing sector for cheap food result in taxation of agriculture in favor of the politically stronger urban and manufacturing sector. With economic development, a declining farming population finds it easier to organize and create political pressure. Concurrently, higher urban wages and a smaller expenditure share on food decrease urban resistance to high food prices, and therefore lower the political cost of subsidizing agriculture (Olson).

With the exception of Bates (1983), most of the empirical literature on the political-economic patterns of agricultural protection and assistance ignores the role of political institutions (e.g., Anderson and Hayami, Balisacan and Roumasset, Binswanger and Scandizzo). By contrast, much of the conceptual work on the political economy of agricultural distortions emphasizes the pivotal impact of political institutions on public policy formation (Bardhan, Bates (1990), Becker, de Janvry and Sadoulet).

This paper analyzes international patterns in total agricultural protection to identify and separate the influence of political systems and rights from the effects of economic development, industrialization, constraints on tax collection, and terms of trade. The study covers 25 countries and 22 commodity groups for the period 1982-1987, and considers

protection and assistance via input and output policies, infrastructure interventions, and economy-wide policies. We use a reduced form approach.

Our data and specification include a taxonomy of four political systems, indexes of civil liberties and political rights, and the PQLI index reflecting equity concerns of government. Collection of these data is a significant contribution of this study.

Beyond the abstraction from political institutions' influences, the empirical literature on agricultural protection patterns suffers from three other limitations, which our paper addresses. First, most studies use nominal protection rates and do not consider all distortions, which also includes input subsidies, marketing subsidies and research and extension. Second, although these empirical papers did warn of a possible simultaneous equation bias since agricultural protection, production, and GNP are interdependent, they fail to test and account for this potential bias in their findings. Last, the reduced forms developed in these papers made only limited attempts to include country-specific constraints on tax collection in the estimated equations. Taxation of agricultural exportables is the major source of surplus for policy makers in developing economies because of limitations on administrative capability and availability of alternative tax instruments. With growth, the taxable income base becomes more diversified and income taxation substitutes for commodity taxation (Newbery and Stern).

Tackling these four shortcomings will contribute to clarification of the stylized facts of agricultural protection and may lead to new conceptual developments. The sustainability of policy reform is a central issue in structural adjustment policies. The stylized facts established here shed some light on the interaction between political institutions and the intensity of demand for agricultural distortions.

The next section motivates and presents the empirical approach. The same section also describes the data. Next, results are presented followed by conclusions summarizing the important findings and possible extensions of the paper.

THE EMPIRICAL APPROACH

Our approach is based on reduced form estimation following Binswanger and Scandizzo, Honma and Hayami, and others. Hence, the exercise is inductive. We wish to establish the stylized facts of political institutional influences on patterns of agricultural protection and assistance. We hope these stylized facts will be regular enough to formulate conjectures and theories consistent with them.

The estimated reduced forms keep most of the explanatory variables used in previous studies and add more variables accounting for political institutions and tax collection constraints. The dependent variable is the producer subsidy equivalent (PSE) per crop in percent of the income received for that crop (value of the crop plus direct payments). The PSE includes assistance (negative if taxation) provided to agricultural producers of a given crop through several major channels: direct transfer (income support); output price-enhancing interventions (tariff, price control, quotas), input assistance, marketing assistance, infrastructure support (R and D, extension) and economy-wide policies (exchange rate). (The first appendix contains a detailed list of policy instruments included in the PSE.)

Political variables comprise four political system dummies, PS1, PS2, PS3, and PS4, which describe multiparty, dominant party, one-party and no-party systems respectively. Two other variables are alternatively used in the empirical investigation. They are two indexes of civil liberties and

political rights, CL and PR, respectively. These two indexes are highly correlated (correlation above .92). The index CL centers on freedom of opinions and organization; PR focuses on voting rights and right of political opponents to organize. Both CL and PR range from 1 to 7 (best to worst). Several political measures are incorporated into the specifications because of the well known fallibility of single measures (Bollen).

The tax constraints variables include the following: the variable RATIO1 is the export value of the crop as a share of the value of total exports of goods (at border prices). For nontradable commodities, it is set to zero. The second variable, RATIO2, is the export tax revenue levied on the crop as a share of total indirect taxation. The first two variables RATIO1 and RATIO2 capture the diversification of bases for export and tax revenues. The third variable, RATIO3, is taxes on income and corporate profit, as a share of total tax revenues. It captures the diversification of fiscal instruments (income taxation) available to the policy maker.

To capture economic development we first construct the PQLI index, which includes literacy, infant mortality and life expectancy at birth measures. The index is increasing in literacy and life expectancy, and decreasing in infant mortality. It is more informative on equity (social objectives of the policy maker) and development than per capita aggregate income, GDPC, which is also used as an alternative. We also include the share of agriculture in GDP, AGSHR. This variable often is used to capture decreasing resistance to agricultural protection and the ability of "small" sectors to obtain assistance with the process of industrialization (Honma and Hayami).

In addition to GDPC and AGSHR, we include a first variable, TOT, which measures the terms of trade of the country with respect to the rest of the world. It is the ratio of export unit value over import unit value. We use

this terms of trade definition because international agricultural terms of trade exhibit very little variation during 1982-87 and do not contribute to the explanatory power of the investigation. Terms of trade variables are proxies for several characteristics. Falling (agricultural) terms of trade capture the changing world environment faced by (agricultural) exports of a country and capture the derived demand for protection. They can also proxy a revenue motive to "squeeze" agricultural exports when the purchase power of exports is falling. The two conjectures lead to opposite sign predictions.

Another important variable, CPADV, measures a country's comparative advantage in agriculture. It is defined as the ratio of agricultural labor productivity over manufacturing labor productivity. Decreasing comparative advantages induce higher demand for assistance. Finally, dummy variables account for commodity, country, and year-intercept changes. Commodities were grouped into grains, oil seeds, meat products, and dairy, and other commodities; countries were lumped into OECD, Africa, Asia, and Latin America. The variable definitions and their sources are presented in the first appendix.

The data cover the period 1982 to 1987, and include 25 countries (counting the EC as one country) from all continents and with differing development levels (19 developing and NIC, and 6 industrialized). Twenty-two commodity groups are included but not for every country. There is a strong emphasis on traded commodities. The complete list of countries and commodities is included in the second appendix. Overall, the data set has 1038 observations.

The estimated equation is

(1) PSE = f(PS1, PS2, PS3, CL(PR), RATIO1, RATIO2,
RATIO3, PQLI(GDPC), AGSHR, TOT, CPADV, (D)),

where D is a vector of dummies for country and commodity groups and years effects and f is linear in parameters. The estimation is carried out in two steps.

First, the equation is estimated using weighted least square regression. The weights in the regression come from differences in estimated variances of some subsets of observations based on Bartlett tests. We identified significant differences of variances in five subgroups (two period groupings and three country groupings). The weighted least square results provide an efficient estimate necessary for testing simultaneity biases.

The next step is to obtain consistent estimates using two stage least squares to address the potential endogeneity of RATIO1, RATIO2, RATIO3, GDPC, AGSHR and CPADV, with the PSE. This second vector of estimates is the second piece of information needed to run the Hausman test on potential simultaneity. This analysis is discussed at the end of the empirical section.

Table 1 presents the weighted least squares results for three specifications, including different sets of intercept dummies and alternative uses of PR and CL, and GDPC and PQLI. We investigated several other specifications with various dummy combinations, transformations of variables (log, different exponents), and interaction terms.

Several results exhibit robust tendencies. First, the political dummy variables PS1, PS2, are positively related to agricultural assistance but in a nonlinear fashion. The intercept represents the PSE for the nonparty system. Moving from no party to dominant party (PS2) tends to have a larger effect than moving from no party to pluralism (PS1). A monotonic and simple

TABLE 1

WEIGHTED LEAST SQUARES REGRESSION
DEPENDENT VARIABLE PSE (IN PERCENT OF CROP VALUE)

VARIABLE	COEFFICIENT	(T-STATISTIC)	COEFFICIENT	(T-STATISTIC)	COEFFICIENT	(T-STATISTIC)
INTERCEPT	-1.4435	(-6.818)	-6.4582	(-4.293)	-2.67592	(-10.721)
PR	-------	--------	-------	--------	0.11971	(5.555)
CL	0.00092	(0.084)	0.10401	(4.864)	-------	-------
PS1	0.19319	(4.098)	0.27670	(4.922)	0.43512	(5.173)
PS2	0.26219	(5.398)	0.38805	(6.505)	0.49491	(6.553)
PS3	-0.15034	(-2.231)	-0.02491	(-0.381)	-0.4153	(-5.463)
RATIO1	-1.30672	(-6.051)	-1.06450	(-4.750)	-1.28968	(-6.066)
RATIO2	-0.02786	(-3.085)	-0.03828	(-4.062)	-0.03979	(-4.490)
RATIO3	0.07935	(1.003)	-0.10336	(-1.121)	0.00193	(0.023)
TOT	0.00461	(5.586)	0.00428	(3.866)	0.00534	(6.117)
AGSHR	0.30792	(1.228)	-0.43064	(-1.731)	2.316	(6.926)
CPADV	-0.30406	(-4.644)	-0.26783	(-4.099)	-0.41386	(-6.564)
PQLI	0.01016	(7.204)	-------	-------	0.01770	(10.022)
GDPC	-------	-------	$6.7959X10^{-7}$	(0.073)	-------	-------
DUMMIES -OECD	-------	-------	0.53206	(5.343)	0.44839	(7.595)
AFRICA	-------	-------	-0.8432	(-1.364)	0.20324	(2.688)
ASIA	-------	-------	-0.04952	(-0.862)	-0.08139	(-1.292)
YEAR '82	-------	-------	-0.13637	(-3.315)	-0.12251	(-3.247)
YEAR '83	-------	-------	-0.09221	(-2.309)	-0.0829	(-2.213)
YEAR '84	-------	-------	-0.11140	(-2.813)	-0.10439	(-2.799)
YEAR '85	-------	-------	-0.05089	(-1.292)	-0.03267	(-0.885)
YEAR '86	-------	-------	-0.02622	(-0.672)	-0.0153	(-0.418)
F-statistic	50.500		29.254		38.243	
R^2 (adjusted)	0.3646		0.3613		0.4271	

relationship between democratization and agricultural assistance has intuitive appeal but was not confirmed by our data.

Second, the development index, PQLI, is persistently positively associated with agricultural protection. This strong tendency confirms previous results established with GDP per capita but with the added dimension of equity concerns. Third, variables RATIO1, RATIO2, are negatively related to agriculture assistance -- diversification of tax and export revenues is related to lower taxation. Fourth, the terms of trade variable, TOT, is positively associated with assistance, suggesting that the revenue motive may be dominant: agricultural assistance is inversely related to the purchase power of exports. Last, the comparative advantage variable, CPADV, is negatively related to protection in almost all specifications. This result is present in most agricultural protection pattern analyses and seems robust. Here, the conjecture is that loss of competitiveness in agriculture relative to the rest of the economy induces a larger demand for assistance.

Results associated with the variables PS3, CL(PR), RATIO3, GDPC, AGSHR and most of the intercept dummies are far less robust to transformation of variables and to specification changes. Variable PS3 gave mixed results. Depending on specification, the coefficient of PS3 was positive or negative but quite often significant. This evidence suggests a dichotomy between mono- or one-party systems and multiparty systems (dominant or pluralistic), without systematic tendency of further democratization to exacerbate demand for assistance.

For the political rights and civil liberties indexes, results appear sensitive to specification but often with the enigmatic association of worsening of political rights with better agricultural assistance. The only robust result comes from specifications including an interaction term CL*PS3 (not reported here). In one-party systems, a worsening of political or civil rights decreases agricultural assistance. The other interaction terms (PS1, PS2, PS4 with PR or CL) were often not significant. This

result suggests that variations in political rights in one-party systems may be sufficient to change the political economy of agricultural assistance. We conjecture that in nonparty systems, pressure groups are so restricted and repressed that changes in political rights or liberties are not sufficient to influence policy formation. In pluralistic systems, political rights are well-secured such that moderate variations in these rights no longer affect the political economy of agricultural policy. Next, the variable RATIO3, the ratio of direct tax revenues over total tax revenues, appears with different signs and significance levels in different specifications. A possible explanation is the noninclusion of sales tax revenues (in contrast to agricultural trade taxes) in RATIO3. Many OECD countries rely heavily on sales taxes, which are not available to LDC governments. The public finance literature tends to focus on direct vs. indirect taxation dichotomy. In our case, it may be more relevant to look at agricultural trade and production taxation versus all other taxes.

When variables GDPC and AGSHR were used together, they tended to reproduce results found in the literature. Declining agricultural share of GDP and increasing per capita are associated with larger PSEs, although the statistical significance was sometimes very low for GDPC's coefficients. This problem worsened in the test of simultaneous equation bias when the two variables were assumed endogenous. For many specifications using AGSHR with PQLI instead of per capita income, AGSHR was positively associated with protection, which is counterintuitive. These mixed results related to AGSHR cast some doubt on the ability of this variable to capture the Olsonian story on decreasing free riding and political resistance associated with economic development and industrialization. The variable PQLI measures economic development better than GDPC. When AGSHR is used with GDPC, it may capture economic development complementarily to GDPC. This does not happen when AGSHR is combined with PQLI.

Last, many intercept dummies accounting for fixed effects of time, commodity (not reported here) and geographical regions were not significantly associated with the PSE

except for the years 1982-84 and for OECD countries. The two dummies separating import-competing, exportables and nontraded commodities also did not appear significant (not reported here). This last "nonresult" may be attributed to the arbitrary classification of import competing and exportables with two-way trade.

The two stage least square estimation is shown in table 2 for the same specification as table 1. We assume that the endogeneity issue concerned the three public finance variables RATIO1, RATIO2, RATIO3, the variables GDPC, AGSHR, and CPADV. All these variables involve farm prices and/or outputs in their definitions. The other variables were assumed predetermined to the PSE, although it is conceivable to argue and test for more simultaneity possibilities. The significance of variable RATIO2 decreases in some specifications. With this exception, most results that were robust in weighted least square estimations are also robust in the two stage least square regressions.

The Hausman test compares the efficient estimate vector under the null hypothesis (no endogenous variable) and a consistent estimate vector under the alternative hypothesis (variables are endogenous). Under the null hypothesis, the difference of the two vectors is distributed Chi Square. We compute a series of tests related to different variables. Table 3 presents the test results. The table shows that variables AGSHR and RATIO3 are endogenous in two of the three specifications. These two variables exhibit sign reversals and considerable in magnitude variation across specifications and methods of estimation. Clearly, instrumental variables techniques should be used when these two variables are included among the explanatory variables. This cautionary result suggests that some of the pattern analyses found in the literature may be spurious.

Finally, results were sensitive to deletion of countries, especially NIC countries. They were also sensitive to the form of expression of the PSE measure (per ton versus percent of reference price or of crop value). This last remark suggests

TABLE 2

TWO STAGE LEAST SQUARE REGRESSION
DEPENDENT VARIABLE PSE (IN PERCENT OF CROP VALUE)

VARIABLE	COEFFICIENT	(T-STATISTIC)	COEFFICIENT	(T-STATISTIC)	COEFFICIENT	(T-STATISTIC)
INTERCEPT	-1.20728	(-5.380)	-0.36006	(-1.884)	-2.95474	(-6.909)
PR	-------	-------	-------	-------	0.12314	(4.329)
CL	-0.00025	(-0.018)	0.06562	(2.465)	-------	-------
PS1	0.28723	(5.102)	0.35179	(5.134)	0.61315	(5.770)
PS2	0.31338	(5.265)	0.38953	(5.399)	0.61339	(6.372)
PS3	-0.21344	(-2.206)	0.04377	(0.553)	-0.42999	(-4.133)
RATIO1	-1.52169	(-2.410)	-1.01239	(-1.364)	-2.02448	(-2.916)
RATIO2	-0.00494	(-1.468)	-0.00119	(-0.321)	0.00162	(0.459)
RATIO3	0.25866	(1.910)	0.09051	(0.626)	0.4959	(0.367)
TOT	0.00277	(2.609)	0.00304	(1.932)	0.00341	(3.052)
AGSHR	0.59771	(1.574)	-0.88807	(-2.561)	3.19901	(4.910)
CPADV	-0.38531	(-3.424)	-0.28157	(-2.432)	-0.48892	(-4.698)
PQLI	0.01163	(5.671)	-------	-------	0.02187	(6.848)
GDPC	-------	-------	$0.46672X10^{-5}$	0.274	-------	-------
DUMMIES -OECD	-------	-------	0.25184	(1.583)	0.36344	(4.312)
AFRICA	-------	-------	-0.15286	(1.977)	0.10060	(1.050)
ASIA	-------	-------	-0.03335	(-0.436)	-0.21411	(-2.533)
YEAR '82	-------	-------	-0.13811	(-2.858)	-1.3703	(-2.930)
YEAR '83	-------	-------	-0.09063	(-1.879)	-0.08972	(-1.935)
YEAR '84	-------	-------	-0.16135	(-3.369)	-0.16448	(-3.557)
YEAR '85	-------	-------	-0.7276	(-1.529)	-0.07093	(-1.548)
YEAR '86	-------	-------	-0.2689	(-0.561)	-0.2055	(-0.446)
F-statistic	36.364		21.167		25.022	
R^2 adjusted	0.287		0.284		0.321	

TABLE 3

HAUSMAN TESTS FOR ENDOGENEITY

VARIABLE BY VARIABLE VARIABLE	SPECIFICATION 1	SPECIFICATION 2	SPECIFICATION 3
AGSHR	0.00+	2.66	13.89
CPADV	0.472	0.70	0.06
Ratio 1	0.866	0.56	0.07
Ratio 2	2.083	0.09	0.27
Ratio 3	0.00+	11.94	8.85
GNPC	-----	-0.01	-----
ALL VARIABLES	6.30	27.45	36.99

that assistance patterns established with nominal protection ratio may not reflect the patterns of global assistance and protection.

CONCLUDING COMMENTS

This paper attempted to tackle four issues concerning international patterns of agricultural assistance: correcting for political characteristics of countries; better measurement of agricultural assistance; accounting for the second best nature of agricultural commodity taxation; and the endogeneity of some of the explanatory variables. On several accounts, this study clarifies previous results on protection patterns and establishes ground for future work. PSE measures undoubtedly are an improvement over the nominal protection ratios used previously. Our results suggest that diversification of commodity base and export revenues decrease agricultural taxation, although we could not significantly associate the latter with access to income taxation.

Political systems appear to influence assistance levels in a nonlinear fashion, i.e., the dichotomy between non- or one-party systems and multiparty systems. The results also suggest that interaction of political rights and political systems is also important for one-party systems. The paper noted that agricultural assistance "peaks" with dominant party systems and then becomes non-increasing with further democratization. This stylized fact suggests that the sustainability of structural adjustment policies (i.e., reduction of distortions) could be compromised in a first democratization effort, but that eventually a fully pluralistic political system would not exacerbate demand for agricultural assistance and protection. The simultaneous equation bias mentioned as a potential problem in many studies clearly is present in this work and begs for a reexamination of previous analyses.

Our future plan of work includes the following issues. It would be interesting to disaggregate the PSE into several subgroups of measure along the PEST/PERT classification to see how the use of different policy instruments evolves with economic development and political institutions (Rausser). PESTs are transfer policies resulting from government failures, whereas PERTs are pie-expanding policies induced by market failures. The objective is to identify PEST-PERT tradeoffs (e.g., high subsidies on output, with high R and D expenditures (Rausser and Foster)). Since PERT policies are always non-negative, the joint estimation of PEST and PERT equations is non-trivial because of the truncated distribution of PERT components.

Our study could also incorporate important farm characteristics such as farm size and geographical dispersion as in Gardner, although the data search for twenty-five countries and many commodities would be considerable.

APPENDIX I ON DATA SOURCES AND VARIABLE DEFINITION

I. POLITICAL VARIABLES

1. CL = Civil liberties: scale from 1 to 7

   with (1) meaning most free to (7) meaning least free, based on comparative standards.
   Civil liberties include freedom of opinions, speech, religion, education, occupation, expression, and organization.

2. PR = Political Rights: scale from 1 to 7
   with (1): fully competitive electoral process
   to (7): political despotism
   Political rights include the rights of people to take a role in deciding the political future of their own society such as voting for legislation, electing representatives, and the right of political opponents to organize (the rights to participate meaningfully in the political process).

3. PS1 = dummy variable for multiparty political system: most democratic political systems allow for opposition parties and dissention.

4. PS2 = dummy variable for dominant party political system: somewhat democratic because the structure of the political process is such that opposition groups do not have a realistic chance of achieving power, although they are allowed to exist.

5. PS3 = dummy variable for one party political system: only one party is allowed to rule.

6. PS4 = dummy variable for military ruling, monarchies.

   For the intercept dummies, only PS1, PS2, and PS3 were used. The variables CL, PR, PS1, PS2, PS3 were collected from the various issues of R. Gastil's Freedom in the World: Political Rights and Civil Liberties and from the Economist Intelligence Unit.

7. PQLI = or Physical Quality of Life Index is an index developed by the Overseas Development Council as a proxy to measure socioeconomic development. It is a composite index calculated by averaging life expectancy, infant mortality, and literacy rates, giving each of the three indicators equal weight. The scale of PQLI is 0 to 100 (100=best, 0=worst). It is also a proxy for the output of the public sector (Tanzi, 1987).

   IMR = Infant Mortality Rates are collected from the World Tables 1988-1989 Edition, The World Bank, Washington, DC, 1989.

   LE = Life Expectancy at Birth is collected from the World Tables 1988-1989 Edition, The World Bank, Washington, DC, 1989.

   LR = Literacy Rates; different years were missing for different countries, so we used three different sources to fill in the gaps. At times, where data were missing for a specific year and country, we averaged the values of the year preceding and the subsequent year. Most times

though, literacy rates were stable from year to year. The sources are:

a. World Education at a Glance. UNESCO, Paris, France, 1985.
b. UNESCO Statistical Yearbook, 1987. UNESCO, Paris, France, 1987.
c. State of the World's Children, 1988, UNICEF, Oxford University Press, Fairlawn, London, 1988.

Note: To calculate the PQLI index we used the method presented in Measuring the Condition of the World's Poor: The Physical Quality of Life Index by Morris David Morris, Pergamon Press, Elmsford, NY, 1979.

II. **PUBLIC FINANCE**

1. RATIO1 = Export value of the crop at F.O.B. prices divided by value of total exports of goods at F.O.B. prices.

The sources are:

numerator: FAO Trade Yearbook, 1984, vol. 38, Food and Agricultural Organization of the United Nations, Rome, Italy, 1985 and FAO Trade Yearbook, 1987, vol. 41, Italy, 1985.
denominator: World Tables 1988-1989 Edition, The World Bank, Washington, DC, 1989.

2. RATIO2 = Export tax revenue (World Price - Producer prices) divided by (Total Tax Revenue - Taxes on Income, profits, and gains).

The sources are:

numerator: (Reference price - producer prices) x level of production. These three numerator variables are found in USDA's Estimates of Producer and Consumer Subsidy Equivalents: Government Intervention in Agriculture, 1982-1987. Agriculture and Trade Analysis, Economic Research Service, U.S. Department of Agriculture, Washington, DC. 1989. These prices and the levels of production are presented in the USDA's PSE report for each crop and each year and each country.
denominator: Total Tax Revenues: from International Monetary Fund. Government Finance Statistics, 1988. Washington, DC, 1988.

3. RATIO3 = ratio of taxes on income, profits, and capital gains over total tax revenues

The sources are the same as for the denominator of Ratio 2.

III. **OTHER VARIABLES**

GDPC = GNP per capita from World Tables, 1988-1989 edition, The World Bank, Washington, DC, 1989. GDPC is deflated by the GNP deflator of IMF-IFS.

TOT = Terms of Trade from World Tables, 1988-1989 edition, The World Bank, Washington, DC, 1989. Ratio of export unit value and import unit value of each country.

CPADV = Comparative advantage defined as the ratio of agricultural output per agricultural worker and GDP per worker from World Tables, 1988-1989 edition, The World Bank, Washington, DC, 1989 for production data; and Yearbook of Labor Statistics, 1982-1988, International Labor Office, Geneva, Switzerland, 1988; and Labor Force Statistics, 1968-1988, OECD, Washington, DC, 1990 for labor force data.

$AGSHR = \frac{AGGDP}{GDP}$ = Agriculture's share in the economy from World Tables, op cit.

$PSERPP = \frac{\text{Subsidy Equivalent as ratio of production value inclusive of direct payments}}{100}$.

Source: USDA. The PSE includes the following policy measures.

1. Income support policies, such as deficiency and diversion payments.
2. Price interventions, such as output taxes, export taxes, quotas, tariffs, and nontarrif border controls.
3. Input assistance, such as fertilizer, feed and pesticide subsidies.
4. Marketing assistance, such as marketing development programs, storage subsidies, grading.
5. Infrastructure support, such as research and extension, land improvement, irrigation infrastructure.
6. Economy-wide policies, mainly exchange rate policies, and general tax policies.

IV. **OTHER SOURCES**

Data for Taiwan, which were not found in the World Tables or FAO Yearbooks, were collected from two main sources: Trade of China: The Chinese Maritime Customs ROC, various issues; and Taiwan Statistical Databook, 1989: Council for Economic Planning and Development, Republic of China, 1989.

Data for the E.C. had to be collected from the 10 member countries and then either averaged or summed. To compute PQLI, we took the weighted average (weight by population) to compute an average index for the EC. Other variables such as GNP or Tax Revenues were summed over all countries. Exchange Rates used for currency conversion came from International Monetary Fund. International Finance Statistics, 1989, Washington, DC, 1989.

India's and China's data in the USDA source had to be corrected for exchange rate overvaluation using Pick's Currency Yearbook.

Some countries had no values for reference prices in the USDA source. We used FAO's Trade Yearbooks to compute the export unit value of the crop by taking the ratio of value and volume of the crop multiplied by the exchange rate to obtain the price in local currency.

APPENDIX 2 ON COUNTRIES AND COMMODITIES

Country	Commodity
Argentina	corn, sorghum, soybeans, wheat
Australia	barley, beef and veal, milk (fluid and manufactured), mutton and lamb, rice, seed cotton, sugar, wheat
Bangladesh	jute, rice, wheat
Brazil	beef and veal, corn, poultry, rice, soybeans, wheat
Canada	barley, beef and veal, corn, flax seed, milk fluid and manufactured, oats, pork, poultry, rapeseed, rye, soybeans, sugar, wheat
Chile	apples, corn, potatoes, sugarbeet, grapes, rapeseed oil, oats, wheat
China	beef and veal, corn, cotton, eggs, honey, mutton and lamb, peanuts, pork, rapeseed, rice, sesame, soybeans, sugar, wheat
Columbia	coffee, soybeans, sugar
Egypt	corn, cotton, rice, sugar, wheat
E.C.	barley, beef and veal, corn, milk, mutton and lamb, pork, poultry, rapeseed, rice, soybeans, sugar, wheat (durum and soft)
India	corn, cotton (lay staple, medium staple), peanuts, rapeseed, rice, sorghum, soybeans, wheat
Indonesia	rice
Japan	barley, beef and veal, chicken, milk (fluid and manufactured), oranges, pork, rice, soybeans, sugar beet, sugar cane, wheat
Kenya	coffee, corn, pyrethrum, rice, sugar, tea
Mexico	corn, cotton, soybeans, sesame, sorghum, soybeans, wheat
New Zealand	beef and veal, milk (fluid and manufactured), mutton and lamb, wool
Nigeria	cocoa, corn, cotton, rice, sugar, wheat

Pakistan	beef and veal, chicken, eggs, milk, rice (basmati, irri), cotton seed, sugar, wheat
Senegal	peanuts
South Africa	corn, sugar, wheat
South Korea	barley, beef and veal, chicken, corn, eggs, milk, pork, rice, soybeans
Taiwan	beef and veal, chicken, corn, milk, pork, rice, sorghum, soybeans, sugar, tobacco, wheat
Thailand	rice
Turkey	barley, corn, wheat
U.S.A.	barley, beef and veal, corn, milk, oats, pork, poultry, rice, sorghum, soybeans, sugar

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