Scott Pearson is Professor of Agricultural Economics at the Food Research Institute, Stanford University. He has participated in projects that combined field research, intensive teaching, and policy analysis in Indonesia, Portugal, Italy, and Kenya. These projects were concerned with studying the impacts of commodity and macroeconomic policies on food and agricultural systems. This effort culminated in a dozen co-authored books. These research endeavors have been part of Pearson’s longstanding interest in understanding better the relationships between a country’s policies affecting its food economy and the underlying efficiency of its agricultural systems.

Pearson received his B.S. in American Institutions (1961) from the University of Wisconsin, his M.A. in International Relations (1965) from Johns Hopkins University, and his Ph.D. in Economics (1969) from Harvard University. He joined the Stanford faculty in 1968.

The framework for agricultural policy analysis developed in this lecture has been described in the literature on agricultural development. The seminal article elaborating this kind of analytical framework is C. Peter Timmer, “The Political Economy of Rice in Asia: A Methodological Introduction,” Food Research Institute Studies 14, No. 3 (1975), pp. 191-196.
A framework is an organized and consistent approach for clear thinking. It is designed to permit the study of linkages in economic systems.

Agricultural refers to the production and consumption of cultivated commodities.

Policies are government actions intended to change behavior of producers and consumers.

Analysis consists of the evaluation of government decisions to change economic behavior.

Four Components of a Policy Framework

- objectives – desired goals of policy
- constraints – economic realities
- policies – government instruments
- strategies – set of instruments
**Objectives** are the desired goals of economic policy as defined by policy makers.

**Constraints** are the economic realities that limit what can be accomplished.

**Policies** are the instruments that governments can use to change economic outcomes.

**Strategies** are the sets of policy instruments that government officials can use to achieve their objectives.


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The **policy framework** is represented by a circular (clockwise) set of causal linkages among the four components.

The **strategies** of policy makers consist of sets of **policies** that are intended to improve economic outcomes.

The selected **policies** work through the **constraints** set by economic parameters.

The **constraints**, set by supply, demand, and world price conditions, either further or impede the attainment of **objectives**.
An assessment of the impact on objectives permits an evaluation of the appropriateness of given strategies.

Most goals of government policy fall under one of three fundamental objectives – efficiency, equity, or security.

**Efficiency** is achieved when the allocation of resources produces the maximum amount of income and the allocation of goods and services brings highest consumer satisfaction.

**Equity** refers to the distribution of income among groups or regions that are targeted by policy makers. Typically, greater equity is achieved by more even distribution of income.

**Security** is furthered when political and economic stability allows producers and consumers to minimize adjustment costs. Food security refers to the availability of food supplies at affordable and reasonably stable prices.
Trade-offs arise when one objective can be furthered only if another is impeded – that is, when gains for one goal result in losses for another.

When trade-offs exist, policymakers have to place weights on the conflicted objectives – by determining how much they value gains for one objective versus losses for the second objective.

Policy makers – not economic analysts – have the responsibility to make these value judgments and assign weights to objectives.

In the rare instances when trade-offs do not arise, policy analysis and policy making are easy. The desired result is to move forward to the extent that resources permit.

Typically, however, economic analysts need to evaluate policies, and policy makers need to make decisions by placing weights on objectives.

A conceptual approach to evaluating trade-offs among objectives in agricultural policy analysis is demonstrated in PAM, pp. 7-11.
Supply, national production, is limited by resources, technologies, relative input prices, and management capabilities.

Demand, national consumption, is limited by population, income, tastes, and relative output prices.

World Prices, for internationally tradable outputs and inputs, define and limit the opportunities to import to increase domestic supply and to export to increase markets for domestic production.

These three economic parameters define the market for an agricultural commodity, as explained and diagrammed in the session on price determination.
Agricultural price policies are commodity specific. Each price policy targets only one commodity at a time. Price policies can also influence agricultural inputs.

Macro-economic policies are nation-wide. Macro policies affect all commodities simultaneously.

Public investment policies are capital expenditures from the public budget. They can affect various agricultural groups – producers, traders, and consumers – differently because they are specific to the areas where the investment occurs.
All agricultural price policy instruments create transfers either to or from the producers or consumers of the affected commodity and the government budget. Some price policies affect only two of these three groups, whereas other instruments affect all three groups. In all instances, at least one group loses and at least one other group benefits.

**Taxes and subsidies** on agricultural commodities result in transfers between the public budget and producers and consumers. Taxes transfer resources to the government, whereas subsidies transfer resources away from the government. For example, a direct production subsidy transfers resources from the government budget to agricultural producers.

**International trade restrictions** are taxes or quotas that limit either imports or exports. By restricting trade, these price policy instruments change domestic price levels. Import restrictions raise domestic prices above comparable world prices, whereas export restrictions lower domestic prices beneath comparable world prices.

**Direct controls** are government regulations of prices, marketing margins, or cropping choices. Typically, direct controls must be accompanied by trade restrictions or taxes/subsidies to be effective; otherwise, “black markets” of illegal trade render the direct controls ineffective. Occasionally, some governments have sufficient police power to enforce direct controls in the absence of accompanying trade regulations. Direct controls of cropping choices can be enforced, for example, if the government allocates irrigation water or purchased inputs.

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### Macro-economic Policies Affecting Agriculture

- monetary and fiscal policies
- foreign exchange rate policies
- factor price (interest, wage, land rental rates), natural resource, and land use policies

Agricultural producers and consumers are heavily influenced by macro-economic policies even though they often have little influence over the setting of these nation-wide policies. Three categories of macro-economic policies affect agriculture.
Monetary and fiscal policies are the core of macro-economic policy because together they influence the rate of price inflation in the national economy, as measured by increases in indexes of consumer or producer prices. Monetary policies refer to controls over the rate of increase in the country’s supply of money and hence the aggregate demand in the economy. If the supply of money is increased faster than the growth of aggregate goods and services, inflationary pressure ensues. Fiscal policies refer to the balance between the government taxing policies that raise government revenue and the public expenditure policies that use that revenue. When government spending exceeds revenue, the government runs a fiscal deficit. That result creates inflation if the deficit is covered by expanding the money supply.

Foreign exchange rate policies directly affect agricultural prices and costs. The foreign exchange rate is the conversion ratio at which domestic currency exchanges for foreign currency. Most agricultural commodities are traded internationally, and most countries either import or export a portion of their agricultural demand or supply. For internationally tradable commodities, the world price sets the domestic price in the absence of trade restrictions (as explained in the session on price determination). The exchange rate thus directly influences the price of an agricultural commodity because the domestic price (in local currency) of a tradable commodity is equal to the world price (in foreign currency) times the exchange rate (the ratio of domestic to foreign currency).

Factor price policies directly affect agricultural costs of production. The primary factors of production are land, labor, and capital. Land and labor costs typically make up a substantial portion of the costs of producing most agricultural commodities in developing countries. Governments often enact macro policies that affect land rental rates, wage rates, or interest rates throughout the economy. Other factor price policies, such as minimum wage floors or interest rate ceilings, influence some sectors more than others. Some governments introduce special policies to attempt to control land uses or to govern the exploitation of natural resources, such as minerals or water. These macro policies can also influence the costs of agricultural production.

### Public Investment Policies

#### Influencing Agriculture

- infrastructure – transportation, irrigation
- human capital – education, training, health
- research and technology – production and processing technologies

**Public investments in infrastructure** can raise returns to agricultural producers or lower agricultural costs of production. Infrastructure refers to essential capital assets, such as roads, ports, and irrigation networks, which would be underprovided by the private sector. These assets are known as “public goods”, and they require public spending from the government’s capital budget. Investments in infrastructure are by nature particular to specific regions and benefit mostly the producers and consumers who live in those regions. Public investment policy is complicated by the fact that infrastructure must be maintained and renewed.

**Public investments in human capital** include a wide range of spending from the government’s capital budget to improve the skill levels and health of agricultural producers and consumers. Investments in formal schools, training and extension centers, public health facilities, and clinics and hospitals are examples of public capital spending that could raise the level of human capital in the agricultural sector. These investments are critical for long-term development, but they often take many years to show dividends in agriculture.

**Public investments in research and technology** are another example of “public goods” that directly benefit agricultural producers and consumers. Countries that enjoy rapid agricultural growth typically invest heavily in agricultural research to breed or adapt high-yielding varieties of food and cash crops developed in international research centers abroad. These “miracle seeds” often require new agricultural production technologies, utilizing better water control and more intensive application of purchased inputs. For some commodities, the technological breakthroughs, funded by public investment, are in agricultural processing rather than in farming.
Governments form agricultural strategies by choosing a set of policies to further their objectives subject to the constraints on the agricultural economy.

The results of a study done by the Food Research Institute, Stanford University in the late 1980s are reported in Scott Pearson et al., Rice Policy in Indonesia (hereafter RPI), 1991. This book provides an illustration of applying the framework for agricultural policy analysis (RPI, pp. 2-6). The framework included rice strategy targets ("strategies"), rice policy instruments ("policies"), principal economic variables ("constraints"), and fundamental food policy objectives ("objectives").
The rice strategy targets consisted of three alternatives. One was to strive for regular exports of rice by attempting to achieve an annual growth rate for rice production of 4 percent. Another was to aim for regular imports of rice by expanding rice production at an annual rate of 1 percent. The third was to hope for an annual growth rate of rice output of 2.5 percent to retain self-sufficiency in rice production on trend (by importing some rice in poor production years and exporting some rice in good production years). The study assessed the likely impact of each of these three strategies.

Five different rice policy instruments contributed to the attainment of these three strategies. Price policy instruments altered the level of domestic rice prices. Price stabilization policies reduced the fluctuation of domestic rice prices. Public investments, especially in infrastructure and research, affected prices, costs, and yields of rice production systems. Macro-economic policies, notably those affecting inflation and the exchange rate, influenced rice production costs and the value of the rice produced. Rural regulations impeded some rice farmers' ability to plant rice.

These policy instruments affected levels of rice production through their influence on three principal economic variables – the amount of rice produced domestically, the level of rural income that was generated directly in rice production or indirectly from the investment or consumption of rice-related incomes, and the level of rural employment created directly or indirectly by rice production.

Each of these three variables in turn influenced the three fundamental food policy objectives. Regular increases in domestic rice output contributed to food security and price stability by reducing exposure to world price fluctuations. The efficient generation of income through rice expansion led to rapid income growth regionally and nationally. The creation of additional rural jobs, directly in rice production or indirectly in rice-related activities, improved the distribution of income between urban and rural areas.

The RPI book concluded that the strategy of trend self-sufficiency was likely to be the one preferred by policy makers in the early 1990s (RPI, pp. 162-169). An effort to achieve regular rice exports would have been inefficient and required regular subsidies, whereas a strategy to import regularly in the early 1990s would have left efficient production opportunities unrealized.
The *RPI* book assessed the reasons for Indonesia’s success during the Green Revolution period of the 1970s and 1980s (*RPI*, pp. 8-21). During that period, Indonesia evolved from being the largest importer of rice in the world to achieving rice self-sufficiency on trend for a decade beginning in 1984. Among the five available types of rice policy instruments, government decisions in four areas were essential for success.

**Rice price level policy** was neutral. The government desired to have efficient rice expansion so it kept domestic rice prices close to the trend of world rice prices, providing neither protection nor dis-protection to rice production. However, to encourage farmers to adopt the new technologies featuring high-yielding varieties of rice seeds, the government heavily subsidized chemical fertilizers during this period, thereby reducing costs of rice production.

**Rice price stabilization policy** was very positive. The National Logistics Agency, BULOG, stabilized domestic rice prices so that domestic rice price fluctuations were considerably less than world rice price fluctuations. BULOG had a monopoly on international trade in rice and varied imports or exports to meet domestic needs. The agency maintained a public buffer stock in rice by buying paddy at a guaranteed floor price and injecting the milled rice into the markets when prices rose. This stabilization policy was expensive but largely successful.

**Public investment policy** in rural infrastructure, health and education facilities, and agricultural research and extension was a key component of Indonesia’s success in tripling rice yields and production and thus in achieving temporary rice self-sufficiency. The government invested heavily in rural roads, ports, and irrigation facilities and for a period devoted as much as 30 percent of its capital budget to rural infrastructure and agricultural research.
**Macro-economic policies** during the 1970s and 1980s were appropriately neutral. The annual rate of inflation typically was held beneath 10 percent, and the exchange rate was devalued periodically to offset the difference between inflation rates in Indonesia and those of its main trading partners. Rice producers thus were neither implicitly taxed nor subsidized by longstanding disequilibrium exchange rates, and they could count on quite stable macro-economic conditions in planning their investments and annual production inputs.

**Rural regulations** were the only negative area of policy affecting rice production in the 1970s and 1980s. In parts of East and Central Java, many farmers were forced by a policy decision to grow sugarcane when they preferred to plant rice. This decision led to less rice production, lower farmer incomes, and less employment relative to levels that would have been created under a free choice of cropping patterns.

**Analysis of Current Rice Policies in Indonesia**

- current policy limits rice imports to raise rice prices in effort to assist producers
- How is this strategy implemented?
- Which objectives are furthered or impeded?
- Could the trade-offs between objectives be eased by a different set of policies?

**Current rice price policy** in Indonesia attempts to raise domestic rice prices to levels about 30 percent higher than they would be if they were instead set wholly by rice import prices. The strategy is to assist rice producers during a period when world rice prices are low, about one-fourth less than their expected long-run trend levels. However, this strategy prevents Indonesian consumers of rice from benefiting from the low world prices and thus has adverse impacts on human nutrition and poverty alleviation.

The policy instrument used to implement this strategy is a specific **tariff on rice imports** of Rupiah 430/kilogram. If this tariff were collected on all imports of rice, the policy would raise domestic prices to levels about 30 percent higher than they would be in the absence of policy. Recent observed levels of domestic rice prices in Indonesia have been about 25-30 percent higher than comparable import prices of rice. However, this outcome does not mean that the tariff is being collected fully and that smuggling is absent. The highly uncertain economic and political environment in Indonesia has
caused rice importers to charge a premium of perhaps 10-20 percent to cover the risks of exchange rate changes and the costs of extra banking charges.

The policy of protecting rice furthers the goal of **increasing rice farmers’ income within the broader equity objective**. However, the policy leads to important trade-offs because it penalizes poor rural and urban consumers of rice. The **tariff does not improve economic efficiency** because it causes scarce resources to be used inefficiently. In an era of low and relatively stable world rice prices, the rice **tariff does little to contribute to food security**. Raising the price of rice also has serious consequences for the nutrition of poor people, and it creates additional poverty by pushing more poor families beneath the poverty line.

In principle, the government could assist rice farmers by using a different price policy instrument – a **direct production subsidy** through which farmers would receive a government subsidy according to the amounts of rice marketed. This policy would avoid raising the domestic price of rice and thus would eliminate the trade-offs between producers and consumers. However, the subsidy policy would be difficult to implement and it would put great pressure on the government budget during a time of fiscal stringency. Some analysts argue that scarce government resources instead should be used to **assist rice farmers to switch gradually to higher valued commodities**.

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### Impact of Current Rice Policies on Objectives

- **price level** – positive for producers (tariff on rice)
- **price stabilization** – ineffective (floor price)
- **public investment** – positive (infrastructure)
- **macroeconomic policies** – roughly neutral (some inflation, uncertain exchange rate)
- **rural regulations** – neutral (no sugar quotas)

In contrast to the rice policy during the Green Revolution period of the 1970s and 1980s, current rice policy in Indonesia has not been very successful. Rice policy has floundered since the mid-1990s and especially since the macro-economic crisis began in mid-1997.

The appropriateness and effectiveness of the **policy to raise rice prices** has been hotly debated. The specific tariff of Rupiah 430/kilogram of rice along with the rice traders’ risk premium have together raised domestic rice price levels about 25-30
percent above comparable import prices. Many government officials appear to feel that the gain to rice producers offsets the loss for rice consumers and the poor, but the issue is under frequent review.

**Price stabilization policy** has fallen into disrepair. Since 1997, BULOG, the agency charged with stabilizing rice prices, has been unable to stabilize domestic rice prices. During 1998, the agency was forced to abandon its effort to prevent rice price increases and the domestic price of rice doubled in four months. In December 1998, the government set an unrealistically high floor price for paddy, and BULOG has not been able to defend that floor price. The agency instead buys about enough rice for its own distribution needs and fails to defend either floor or ceiling prices for rice. Due to ineffective price stabilization, the government removed BULOG’s international trade monopoly on rice imports in 1999.

**Public investment policy** for rice has continued as before, but at lower and less effective levels. Some of the earlier irrigation and transport infrastructure now requires rehabilitation and greater maintenance. Budgetary stringency during the macro crisis has added greatly to the difficulties of expanding rural infrastructure.

**Macroeconomic policies** became much less stable because of the macro crisis. With the important exception of 1998 (when the annual rate of inflation exceeded 80 percent), the government’s monetary and fiscal policies have kept inflation in reasonable check (8-12 percent per year). But enormous uncertainty for the Indonesian economy has come from the wildly fluctuating foreign exchange rate, which depreciated from about Rupiah 2500 per US dollar in mid-1997 to over 17000 in early 1998 before settling in a range of 8000-12000 thereafter.

**Rural regulations** have been reformed. Rice farmers in East and Central Java are no longer required to plant sugarcane for mills operated by the Ministry of Agriculture. However, some Javanese farmers complain that local government officials still attempt to regulate their choices of cropping patterns.

These summary conclusions are elaborated in several team papers. Please visit the “Food Policy Agenda” section of the project website.
In principle, governments form agricultural strategies by choosing a set of policies to further their objectives subject to the constraints on the agricultural economy.

This conceptual framework has been illustrated by contrasting rice policy in Indonesia in two periods – the Green Revolution of the 1970s and 1980s and the macro crisis period of 1997-present. The earlier period is analyzed in the RPI book, whereas the recent period is examined in numerous team papers, all available in the “Food Policy Agenda” section of the project website, notably the four papers linked in slide 14.

During the Green Revolution, rice strategy was to introduce a new technology of high-yielding varieties, improved water control, chemical fertilizer applications, and better marketing and irrigation infrastructure. Fertilizer subsidies, stable rice prices, free irrigation water, better roads, and stable macro-economic conditions complemented this new technology and encouraged its rapid dissemination. These policies significantly altered the economic constraints and allowed output and incomes from rice to more than triple.

These happy circumstances promoted all three primary objectives – efficiency, equity, and security. The increases in rice production were created by improved technologies, not policy transfers, rice prices were maintained at about the trend of world prices, and efficiency was improved. Technological gains permitted increases in rice farmer profits and incomes while consumers of rice benefited from the gradually declining world and domestic rice prices. Hence, there were few trade-offs in equity. Food security improved as Indonesia eliminated rice imports with efficient increases in domestic output, in an environment of relatively stable domestic rice prices. The strategy to promote the dissemination of new high-yielding technologies was thus successful on nearly all accounts.
During the recent macro-economic crisis, rice strategy has fallen into disarray. The rice strategy has been to attempt to aid rice farmer incomes in a period of unusually low world rice prices. In contrast to the earlier period, there has not been any new technology to disseminate. Nearly all Indonesian farmers now plant high-yielding varieties of rice. Further improvements in irrigation and transportation have been hampered by severe budgetary pressures and needs to limit government capital spending. Struck by fiscal limitations, contradictory policies, and charges of corruption and mismanagement, BULOG has not been able to stabilize rice prices. Rapid and sizeable swings in the exchange rate have greatly increased the uncertainties in rice production and marketing.

Difficult trade-offs now affect rice policy. The principal policy instruments have been the specific tariff on rice imports, which has helped to raise domestic prices by 25-30 percent, and a limited subsidy on rice consumption in selected poor villages and urban centers. The rural and urban poor have only been partly compensated for the increase in rice prices caused by policy. Public opinion favoring rice farmers argues for maintaining or even raising the rice tariff, especially to offset unusually low world rice prices. The opposite opinion, favoring poor rice consumers, argues that the country should take advantage of low world rice prices to benefit the nutrition of poor Indonesians and to alleviate their poverty. The weights that policy makers place on these conflicting objectives thus take center stage in the policy debate as Indonesia seeks to identify a consistent and successful rice strategy.