THE MODERNIZATION OF BRAZILIAN AGRICULTURE*

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It is a pleasure to be on your program today, and to see so many old friends and acquaintances. I believe this is the third time I have been on your program over the years, and it is always a rewarding experience.

As a topic for discussion, the modernization of Brazilian agriculture is especially interesting and important. In the first place, Brazil, together with Argentina, is rapidly becoming an important "breadbasket" for the world. It is competing exceptionally well with the United States for soybean and other commodity markets, and in a very short period of time has begun to export US$3 billions a year in beef, after having become the world's largest exporter of frozen orange juice and poultry, and becoming increasingly important in other commodity markets. Even the New York Times refers to Brazil as the new breadbasket of the world.

In the second place, it is important to understand **how** Brazil has become such an important competitor in international markets in such a short time. This story seems to be poorly understood, and for that reason I plan to concentrate my remarks on that issue.

It is interesting that Brazil has often been referred to as a "sleeping giant." Observers have always expected that Brazil could compete well in international market – both in agricultural and industrial products. In fact, Brazil became well known in the past as the "country of the future" by close foreign observers. Ironically, many Brazilians complained that Brazil could not compete in international markets, and for a long time that described its performance.

What the record shows, however, is that once Brazil got its economic and science and technology policies in order, it could compete extremely well. The main elements of these policies include (1) trade and exchange rate policies, and (2) science and technology policy. Both are important, and both have important details that I want to consider. As a special third topic, I want to discuss the inter-sectoral labor market and the flow of labor out of agriculture as the sector has undergone a major transformation. Developments in that sector are an important part of the competitiveness issue.

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Trade and Exchange Rate Policies

In the period immediately following World War II, Brazil epitomized the use of import-substituting industrialization policies to promote its economic growth and development. Those policies included high rates of protection for the manufacturing sector, high levels of explicit taxes on agricultural exports, and a grossly over-valued currency – itself an implicit export tax. If one thinks about these policies just a bit, it is not difficult to understand why the country could not compete in international markets.

These policies were basically a failure. Industrial output expanded at a modest rate, but the general economy limped from economic crisis to economic crisis. Moreover, even industrial employment stagnated, despite the expansion of industrial output at a rate of about 10 percent a year.

Brazil underwent a series of policy reforms in the late 1960s, and then benefited greatly from the misguided economic policies of the 1970s in response to the quadrupling of petroleum prices by OPEC in 1973. The misguided economic policies I refer to include the enormous monetary bubble perpetrated by the international community as a way of bailing out countries harmed by high petroleum prices instead of urging devaluations for those countries. Thanks to these stimulative policies and abundant international credit, Brazil had the highest economic growth rate during the decade.

The reversal of U.S. monetary policy in late 1979 imposed an enormous economic shock on the international economy. The decade of the 1980s was characterized as one of "Economic Crisis" for the developing countries as a whole, and especially for Latin America. The crisis was especially severe for Brazil.

Again, Brazil limped from one economic crisis to another. These crises included periods of hyper-inflation, huge deficits in the balance of payments, huge borrowings from abroad, and very unstable macroeconomic policies. This created a very unhealthy economic environment for the agricultural sector.

During the early 1990s, Brazil finally began to gain control of its macroeconomic policies. In 1994, it changed its currency from the cruzeiro to the **real**, and began to tightly manage it currency policies. In 1999, it undertook a final significant volitional devaluation of its currency, and then set it free to float. (Later, when the current President was elected, the value of the currency declined again rather significantly, but in that case it was in response to market forces.)

During this extended period, Brazil significantly lowered the protection of its manufacturing sector, and also reduced the taxes on agricultural exports. With the value of its currency moving closer to its equilibrium value, the **implicit** taxation of its exports also declined.

To summarize, the combination of reforms in both trade and exchange rate policies shifted the domestic terms of trade from being unfavorable to the agricultural

sector to being in favor of it. This provided strong incentives for resources to flow towards agriculture and to make that sector an attractive sector for investment.

To conclude, there is some evidence that the Brazilian currency was until recently under-valued. If that proves to be the case, this will have been a complete reversal of currency policy – from being highly over-valued and thus a tax on agriculture, to being under-valued and a subsidy on exports. The value of the **Real** has trended upward in recent months, so it may be moving towards equilibrium.

Science and Technology Policy

Brazil undertook a major reform of its agricultural research system in the 1970s. EMBRAPA, as it is popularly known, is a quasi-public institution that in many dimensions acts like a private corporation, while at the same time receiving substantial public support. It is a comprehensive national system, with many of its functions decentralized. At the same time, it has a limited number of specialized research institutes that concentrate on specific commodity problems.

For a time, EMBRAPA was supported financially quite well by the Federal government, and by international financial institutions such as the World Bank, the Inter - American Development Bank, and the U.S. Agency for International Development. In the process of developing and expanding its programs, it was for a number of years sending as many as one-thousand of its staff for graduate training each year – within Brazil and abroad.

Many observers believe EMBRAPA to be one of the best, if not **the** best, agricultural research system in the developing world. Although its financial support both domestically and from abroad has declined substantially over time, it is still a robust and vital organization.

My reasons for discussing EMBRAPA are rooted in the role it has played in the increased international competitiveness of Brazilian agriculture. This is important, because this competitiveness seems to be poorly understood. I have heard and read stories that explained it by the large amount of land that Brazil has, by the clearing of the Amazon rain-forests and the failure to consider environmental effects, and by improvements in the transportation system. As in most such cases, there is a little bit of truth in each of these possible explanations.

An important part of the story of Brazil's improved competitiveness, however, is that EMBRAPA has learned how to use its tropical soils. Tropical soils in the case of Brazil include the **cerrados** – a rather low-productivity climax vegetation. And Brazil has hundreds of millions of acres of these soils – many of them with very low levels of productivity.

To make these soils more productive, EMBRAPA learned that modest amounts of lime and phosphorous can quadruple and more the productivity of these soils. This is the

equivalent of taking land with very low levels of productivity – and making them effectively productive.

To complement this breakthrough in the use of soils, EMBRAPA has also developed improved varieties of soybeans that are adapted to these soils and their ecological conditions. Moreover, they have improved maize in the same way. I used to tell American farmers not to worry about the competition in soybeans from Brazil – that we in the United States would always have comparative advantage in maize. I no longer can say that.

In any case, it is true that Brazil has much land that it has recently brought into production, and that it has the potential to do more. It is **not** the case that it is devastating a lot of the Amazon rain forests to bring more land into production. Most of the recent expansion of soybean production has been in the Central West as the large areas of **cerrados** have been converted to fertile soils. And finally, it is true that Brazil has been expanding the transportation in the Central West. However, if it were not for the technological breakthrough that made the soils of that region more productive, there would have been no revolution for that region.

For those interested, Brazil still has a lot more **cerrado** soils to bring into production. You should also know that the **llano** soils of Colombia are essentially the same as the **cerrados,** as are the savannah soils of Sub Sahara Africa. As you can see, the potential of the Brazilian breakthrough is quite great.

To conclude, let me make just a few more remarks on the Brazilian modernization process. First, the increase in yields is very substantial. The Minister made reference to that in his remarks last evening. This increase is explained by the improvement of varieties, and a substantial increase in the use of fertilizers – to near the levels used in the United States. And finally, a 20 percent increase in area cultivated has been facilitated by a rapid process of mechanization. The **cerrado** soils tend to be flat, and thus mechanization is easy.

The Inter-Sectoral Labor Market

The traditional process when the agricultural labor force declines to about 25 to 30 percent of the total civilian labor force is that the exodus of labor from agriculture tends to accelerate. That has not been the case in Brazil. The trend is downward, but at a relatively slow pace.

The reason for this is that the growth of the economy has been relatively slow, with relatively high levels of unemployment. This is a consequence in part of the stabilization policies of the monetary authorities, with the result that interest rates have been around 18 to 19 percent for some years. This lack of opportunity in the non-farm sector has limited out-migration from agriculture.

I mention this aspect of the modernization process because it helps explain the pace of agricultural growth and the competitiveness of the sector. Abundant labor has contributed to a higher rate of agricultural growth, and at the same time has contributed to keeping the cost of production low, especially for labor-intensive commodities.

There is another positive feature to this process. The vitality of the agricultural sector has been such that agriculture could continue to be an employer of last resort. Thus, it has made it possible for the level of unemployment to be lower than it would otherwise have been.

Concluding Comments

Brazil illustrates what good economic policy can do to promote the modernization of agriculture. Sound economic policy and sound science and technology policy are highly complementary. Sound economic policy refers for the most part to sound macroeconomic policy, as many of you have heard me say before. That policy is the key to shifting the domestic terms of trade in favor of agriculture, and thus to getting the incentives right for adopting the new production technology.

Science and technology policy is needed to produce the flow of new production technology that is such a powerful source of economic growth. It is also the key to being competitive in international trade markets.

Finally, let me note that the emergence of Brazil in global markets is not just a one-time event. As long as the country keeps its economic policies right and continues to strengthen and expand its agricultural research capacity, it has a large unexploited capacity to take advantage of. Brazil will continue to be a major supplier of food far into the future. Moreover, there is much other countries can learn from the Brazilian experience.