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Catering for Future Needs: Challenges for Farmers, Traders and Government

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1. Introduction

Until the early eighties the question how China could feed its people was a primary concern but nowadays, the puzzle is how the country can feed its livestock. This in itself reflects the impressive success achieved during this period. More specifically, from a trade perspective the policy question is whether, in the light of the fast-rising demand for animal proteins by Chinese consumers as per capita incomes rise dramatically, and the sustained rural to urban migration, the country should aim at (i) selfsufficiency in cereals, protein feeds and meat, including animal feed; or (ii) at importing feed; or (iii) at importing meat. These questions are to be answered in the context of the WTO-accession, the Doha Round, and more generally China's opening to world trade. Distributional issues constitute a second group of policy concerns, as the fast changes in income and the persistent migration generate major income disparities between rural and urban across the country and between regions. A third group of issues relates to the policy responses in the sphere of natural resource management, changes in land use, the scope for expanding irrigation in the areas that can produce animal feeds, and the scope for improved rangeland management.

2. A Regionalized Model-based Assessment

China's food problems have to be analyzed within a broader economic framework that incorporates various policy measures, and is capable of testing a wide range of policy options. China's labor force is moving from agriculture to the industrial and service sectors, and the typical rural household has become less dependent on agriculture. An increasing number of households will purchase a growing share of their food on the market and buy increasing amounts of meat, and through this trigger high demand for animal feeds. Yet, complete agricultural self-reliance may be of lesser priority, as China increasingly generates foreign exchange through industrial exports.

To study these issues, CHINAGRO conducts its analysis within a modeling framework that (i) represents the consumer, producer and government decisions in the various regions, with farmers represented at county-level; (ii) builds the supply response on spatially explicit assessment of the resource base and its bio-physical characteristics; (iii) describes agricultural processing and supply of farm inputs; (iv) accounts for transportation costs in the economy,

The model provides a representation of different social agents in different regions, their income levels, preferences, resource constraints, and certain environmental implications of their activities and covers interactions on regional markets between supply, demand, and prices, both in the absence of, as well as in response to policy changes while allowing for interregional as well as international trade.

A distinctive feature of the CHINAGRO project is that we seek to pay due attention to the enormous spatial and social diversity of the country. We realize this aim by conducting our analysis at county level, distinguishing over 2400 of these administrative units. This detail is essential in the analysis of Chinese agriculture and its scope for transformation, because the country is so diverse, and through its fast economic growth becoming ever more so: population densities differ tremendously throughout China; consumers have different lifestyles across the country; crop growing conditions, cropping patterns and yields vary widely; distances are large, and imply that a policy change, say at the border, will affect consumers and producers very differently, depending on their location.

The model is especially suitable for policy trade-off analysis (i.e. efficiency vs. equity, rural vs. urban, inland vs. coastal, agriculture vs. industries, export vs. import, etc.), as it admits an explicit representation of various policy measures under different scenarios of external driving forces.

Welfare analysis offers the integrative framework to include biophysical, agronomic, economic, and socio-demographic dimensions and this project is among the first to apply welfare analysis in a context with strong biophysical linkages with this spatial detail.

3. Scenario context

In the CHINAGRO scenario formulation the following categories of external driving forces are being distinguished:

Demographic change and urbanization; farmland availability; trade policies; technological progress in agriculture; overall economic growth; conditions on international markets.

Demographic change

During three decades after 1950, China experienced an extraordinary population growth. Daunting prospects of feeding an ever-increasing population triggered the Chinese government to enforce drastic population planning measures. At present, China's economic growth goes hand in hand with a rapid demographic transition process: total fertility rates declined from 4.2 in the 1970s to below replacement level.

The factors fostering the fertility transition in China are largely attributable to the government's strict population policies and family planning programs, as well as to the profound socioeconomic changes and massive urbanization trends. Five national population projections were developed in CHINAGRO, clustering assumptions in a scenario matrix along two groups of attributes: fertility, mortality, educational achievements, and migration on the one hand, and convergence of fertility levels in educational categories and in respectively the urban and rural sectors, on the other. For the national total, the population projections start from a level of 1.275 billion in 2000. There is relatively little variation among projections of total population for year 2010 (about 1.36 billion) and year 2020 (1.41-1.43 billion), the range becoming somewhat wider thereafter; in year 2030 a projected range of 1.43-1.47 billion people is estimated.

Urbanization

In contrast to rapid industrialization attained primarily due to an abundant labor force, China's urbanization has proceeded rather slowly during 1980 – 2000 due to urban-rural segmenting institutional regulations. Now the process of urbanization is being considered

as a mighty potential for economic development in the next phase. It is anticipated that urbanization will accelerate in the next decades thus making significant contributions to economic growth.

Starting from 36 percent urban population estimated by the 5th Census for year 2000, and based on different assumptions on the prospects of China's market-orientated institutional reforms, we project that China's urbanization level will reach 42 to 45 percent in 2010, some 48 to 55 percent in 2020, and will fall in the range of 54 to 64 percent in 2030.

Economic Growth

Remarkable progress has been achieved in the economic performance after China started its reform in the late 1970s. Annual average growth rates of gross domestic product (GDP) reached about 10 percent in the past 2 decades.

In the Eleventh Five Year Plan (2001-2005) and the strategy for long-term economic development, China set its ambitious goals to move the nation to a "welfare society" (*Xaiokun Shehui*) in the next 20 years: double GDP in each 10 years; a smooth transformation of the economy from transition to development, from rural to urban, and from agriculture to industry and services; sustainable management of the environment; and other social and political targets (Jiang Zemin, 2002).

High growth is also likely to continue in the coming decade though the growth rates might be reduced gradually over time. Accounting for uncertainty in external factors and China's ability to manage its economy, three alternative growth scenarios were formulated to set the macroeconomic context within which agriculture will operate. The projections assume that by 2020 China's economy will grow to a level of 3.9 to 4.2 its size in 2000. By 2030, total GDP would reach 5.4 to 7.5 times the size of GDP in 2000.

4. Findings from model-based simulations

Role of agriculture in the economy

The simulations with the CHINAGRO welfare model indicate that the role of agriculture in the national economy will be significantly diminished, which continues such trend observed in the past, when rapid economic growth has been accompanied by sharp structural changes in the economy. While agriculture accounted for more than 30 percent of GDP prior to the economic reforms in 1979, by 2000 the share of agriculture had fallen to 16 percent. The share of service sectors in the national GDP increased from 13 percent in 1970 to 21 percent in 1980 and 33 percent in 2000. The share of industry remained relatively stable at around 45-50 percent.

In the Baserun scenario, agricultural value added grows at an average annual rate of 2.7 percent, compared to 6.5 percent per annum for total value added. Hence, the calculated share of agricultural value added in total value added declines to about 30 percent of its value in the base year.

The model results indicate some regional variation: for the Northeast and Southwest the share of agricultural value added decreases to about 40 percent its base year level. For the East region this ratio reduces to 20 percent of its base year value.

Changes in Demand Structure

Total direct food consumption of cereals and other staple grains changes modestly in the Baserun simulations, an increase of only 3 percent during 2003 to 2030. The explanation lies in two factors: first, the food consumption level in China is already high and there is a low or even negative propensity to spend extra income on food grains. Second, there are significant differences between rural and urban consumption patterns, with lower per capita consumption of cereals in the urban lifestyles compared to rural diets. As a consequence, there is a 10 percent decline in average per capita consumption of cereals even though per capita incomes are much higher than in the base year.

Urban food consumption of cereals accounted for less than 30 percent in 2003; this proportion will become nearly 50 percent by year 2030.

While urbanization is slowing down cereal consumption it will likely accelerate increases in meat consumption. Urban diets include higher consumption of meat and per capita meat consumption is responding strongly to income growth. An important change is a rise in meat consumption per capita: from 49kg per capita in 2003 to 86 kg in 2030, which still falls a few kg below the present-day average of industrialized countries and almost 30kg below the figures for United States. In the Baserun simulations these factors combine to result in a doubling of total meat consumption between 2003 and 2030.

Challenges for Farmers and Traders

The basic question is, therefore, no longer whether farmers can feed China's vast population, but rather how farmers can feed the required animals. Related to this is the question whether, if China were to rely on imports, it should import meat, or import feedgrain for raising the livestock. In this connection, some important aspects of the economic geography of the country need to be noted.

First, several major urban concentrations are situated along the coast and, except in the delta region, separated from the hinterland by hill tracts. Since inland transport is far more expensive than ocean shipping, especially when transporting from locations in rugged or hilly terrain, this gives foreign suppliers a significant cost advantage. In other words, at competitive pricing of products it may be cheaper to export meat or feedgrains from New York or Rotterdam to Shanghai than from the Red Basin where much of the livestock is being produced, and similarly, transporting maize from the Northeast to the Southwest may be as costly as importing it from overseas.

Secondly, this argument works also the other direction. Farmers located inland are in general well positioned to produce animal feeds and meat but enjoy less natural advantage in producing vegetables and fruits and other high value foods. Their location also gives them a considerable advantage in supplying nearby population concentrations with these products as compared to foreign exports, also because richer consumers prefer fresh meat that is not deep-frozen and hence produced locally, with little competition from far away coastal areas.

Thirdly, in Western Europe and the US pork and poultry production and dairy are generally produced either close to the consumer or close to harbors. This is because harbors offer good sites for food processing plants that provide much of the animal feeds, say, through processing of oilseeds, and for bulk imports. Again, in China this creates a handicap for inland farmers who may, also in view of their small farm size and already relatively high crop yields may have little alternative to improve their incomes.

In short, the answer to the important question whether China should import meat or feedgrains is a subtle and geographically highly differentiated one, with major social ramifications.

Policy-relevant outcomes

From the simulation experiments carried out in CHINAGRO we can summarize a few policy relevant conclusions:

- Due to the demographic momentum, population will grow by 12 to 15 percent above the level in 2000.
- A more important change in lifestyles derives from substantial projected income growth and urbanization. We project the level of urbanization to fall within a range of 55 to 65 percent in 2030 compared to 36 percent in 2000. These two factors will have profound impacts on demand structure and levels.
- Total food consumption of cereals is projected to remain close to current levels. Two factors combine to produce this outcome. First, food consumption levels are already high and wealthier consumers tend to substitute for staples with livestock products and vegetables. Urban consumers have lower per capita consumption levels of cereals than rural people.
- We project consumption of livestock and fish products to approximately double. The argument is that both income growth and a growing number of consumers adopting urban lifestyles will reinforce the growth in meat consumption.
- At the projected level of per capita meat consumption, China would be approaching the current per capita consumption in industrialized countries.
- Full removal of border protection beyond currently planned levels results in a reduction of agricultural value added of 7.5 percent in model simulations to 2030 (compared to Baserun) and a significant gain in consumer welfare as expressed, for example, in higher meat consumption per caput of nearly 4 percent.
- In the model simulations the impact of sustaining technological improvements is by far more important for the model outcomes than the effect of fully removing remaining border protection. Results support the importance of R&D spending.
- Geography plays a major role not only in environmental differences but also in economic matters. This needs to be reflected in policy analysis and formulation, which must be geographically differentiated.
- The simulation results indicate that inland regions are still insulated from competition even after full removal of border protection due to high trade and transportation margins. While coastal provinces (East and South region) experience a reduction in agricultural value added of more than 10 percent, the reduction of agricultural value added relative to the Baserun is less than 4 percent in Southwest and Northwest regions.
- The results highlight that the economic costs of trade and transportation have effects similar to protection and taxation. Their reduction improves efficiency but will also reduce the insulation of farmers from competition. This effect is critical for the income position of farmers in regions with limited scope for improved agricultural productivity and lack of off-farm opportunities.