

PAKISTAN

Strategy Support Program



IMPLICATIONS OF PRODUCTIVITY GROWTH IN PAKISTAN - AN ECONOMY WIDE ANALYSIS

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This policy note describes the economy wide implications of public investments and policies developed under Pakistan's new Framework for Economic Growth. Policies based on this Framework are expected to lead to substantial gains in productivity in the industrial and service sectors of Pakistan's economy. We use Computable General Equilibrium (CGE) analysis to compare the implications on welfare and growth under different distributions of productivity growth across sectors.

Our CGE model simulations using a new 2008 Social Accounting Matrix (SAM) for Pakistan show that achieving high productivity growth targets broadly consistent with the Framework for Economic Growth, which focuses on non-agricultural/urban growth, would imply a 9.3 percent per year gain in average household income (compared to trend growth in household incomes of 5.8 percent). Accelerating agricultural growth as well, however, would result in even greater overall economic growth, with an additional 2.6 percent gain in average household income. Moreover, with accelerated agriculture growth, real incomes of poor household groups rise substantially, by an additional 2.9 to 4.5 percent, the as food-deficit urban poor and poor rural non-farm households benefit from lower real food prices, as agricultural growth spurs rural non-farm output and incomes.

RECENT ECONOMIC PERFORMANCE

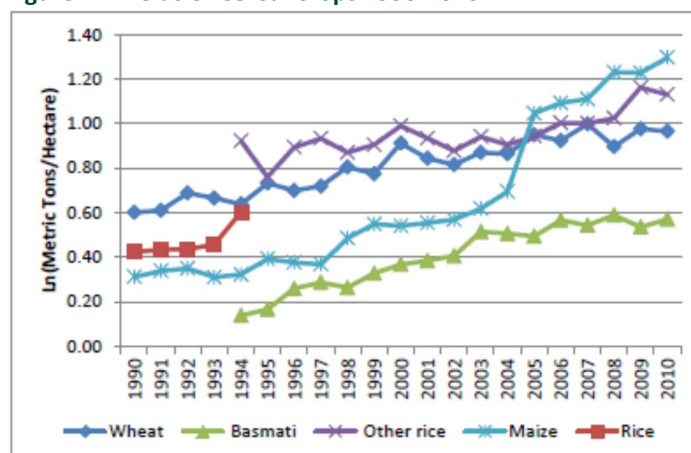
In the years between 2000 and 2010, Pakistan's economy has seen a divergence between agriculture and industry, with the agricultural sector experiencing a slow-down relative to the previous decade and to industry.

The agricultural sector in Pakistan experienced an average annual growth of 3.4 percent between 2000 and 2010, which is substantially lower than that experienced during 1990–2000, at 4.4 percent per year. During the same period, the services and industry sectors grew almost twice as fast, expanding by 5.8 and 6.4 percent per year respectively. Agriculture and industry have historically had similar growth and only diverged in the 2000s.

Within agriculture, all subsectors (except fishing) grew at slower rates, but major crops (wheat, cotton, rice, and sugar cane) and minor crop subsectors grew most slowly, at 2.8 and 1.3 percent per year respectively. As total cultivated land continued to grow at rates similar to the previous decade, the reduction of the growth rate of value-added in agriculture is explained in part by the evolution of crop yields, shown in the first Figure.

The rate of growth of productivity of the major cereal crops, especially basmati rice and wheat, decelerated in the last decade. The reduction in the rate of growth of agriculture was also related to a deceleration in the production growth rate of the livestock sector. While from 1990–2000 livestock grew (in real terms) at 7.0 percent per year, in the last decade its growth rate was below 5 percent. In 2010, the crop subsector accounted for 44 percent of value-added of agriculture, while livestock accounted for 53 percent.

Figure 1—Yields of Cereal Crops 1990–2010



Regarding international trade, Pakistan started the last decade with an economy that exported 12.2 percent of GDP and imported 15.3 percent of GDP. During the course of the decade, while exports grew, imports grew much faster: export receipts grew by 11.8 percent per year, while import payments rose by 17.2 percent per year. This widened Pakistan's trade deficit from 2.2 billion in 2000 to 13.2 billion (current) USD in 2010. Remittances (transfers) and merchandise exports are the two largest sources of earnings in the current account balance of Pakistan, which financed 30.7 percent and 56.3 percent of the net change in import payments respectively during this ten year period.

On the fiscal side, between 2000 and 2010, the federal budget continued to incur large deficits. Revenues grew by 5.09 percent per year on average, but, in absolute terms, federal expenditures grew much faster, increasing by Rs. 401 billion (2005) rupees. This gap has been closing to some extent, as expenditures have been growing at 3.88 percent per year, somewhat slower than the revenue growth rate of 5.09.

THE PAKISTAN CGE MODEL

The Pakistan CGE model based on the 2008 SAM includes 51 sector-specific producers, 27 production factors, and 18 representative household groups. Of the 51 production sectors, 12 are primary ones¹, while eight produce crops. Regarding industrial production, six are agricultural processing sectors, for which output is closely linked to primary agricultural production. The remaining industrial sectors (14) include lint, yarn, clothing, knitwear, garments, other textiles, and other manufacturing. There are 19 service sectors.

The 18 household groups in the model highlight differences in resources and location within the population, with an emphasis on rural areas. The 12 agriculturally-based groups are classified by household location (Punjab, Sindh, and Other Pakistan) and type of land holding (large/medium farms, small farms, dry farms, and landless agricultural laborers). In addition, there are four non-farm national aggregates: rural non-farm poor and non-poor, and urban poor and non-poor. The urban poor are defined as those in urban expenditure quintiles 1 and 2. The rural non-farm poor are defined as those in rural expenditure quintiles 1 and 2.

Using this CGE model, we compare effects of increased sectoral productivity under different scenarios.

MODEL SIMULATIONS 1-5: UNDERSTANDING SECTORAL CONTRIBUTION

In order to understand the contribution of various subsectors, we examine the effects of identical 10 percent increases in total factor productivity for various sectors of the economy (Simulations 1 through 4) and for all economic sectors (Simulation 5).

Sectoral Contribution to GDP Growth

Productivity enhanced by 10 percent in crops, livestock, industry and services leads, respectively, to gains in annual GDP of 1.8, 1.0, 1.2, and 5.4 percent. In general, the effect on total GDP largely reflects the size of the shocked sector. When total factor productivity is increased for all sectors in the economy at the same time, the gain in GDP is naturally 10 percent. Productivity shocks increase production not only in the sector that experiences the shock, but they also lead to increased production in other sectors, as factors of production (particularly labor) are able to move to other sectors.

For example, increasing productivity in crops leads to an overall increase in GDP of 1.8 percent, with value-added in the primary crop sector increasing by 4.4 percent, the industrial sector (which is strongly linked to the crops sector) by 3.8 percent and the services sector by a small 0.1 percent.

Livestock/dairy accounts for 11 percent of domestic GDP. Over 6 million small farmers and landless rural workers are engaged in dairy production, with women often responsible for, and managers of, the resulting incomes. As a consequence, improvements in productivity of small-scale dairy production would have very widespread benefits throughout rural areas. In the livestock/dairy growth scenario, annual GDP of the primary sector increases by 5.2 percent. The linkages to other sectors is smaller for the livestock sector and therefore the overall impact on GDP is smaller than for crops.

CHANGE IN VALUE-ADDED IN REAL TERMS DUE TO 10% PRODUCTIVITY INCREASE IN VARIOUS SECTORS

(Base in billion rupees, rest in % changes)

	BASE	Sim1 Crop	Sim2 Live- stock	Sim3 Indus- try	Sim4 Ser- vices	Sim5 All Sec- torS
TOTAL	9921.6	1.8	1.0	1.2	5.4	10.0
Primary	2017.2	4.4	5.2	0.0	0.0	10.0
Indus- try	2252.0	3.8	-0.2	3.3	2.5	10.2
Ser- vices	5652.4	0.1	0.1	0.8	8.5	9.9

Source: Model simulations

Impact on Per-Capita Household Incomes

Among the individual scenarios analyzed, improving agricultural productivity (crops and livestock) leads to the highest increases in rural non-farm and urban household incomes. Improved agricultural productivity has positive effects on rural per-capita income and creates very significant and positive income linkages that benefit rural non-farm (poor and non-poor) and urban inhabitants (poor and non-poor), as they can buy agricultural output at a lower real cost.

CHANGE IN REAL PER-CAPITA INCOMES DUE TO 10% PRODUCTIVITY INCREASE IN VARIOUS SECTORS

(Base in thousand rupees per year, rest in % changes)

The only exception to the increase in income in the agricultural productivity simulation is given by the large/medium land holders, whose income relies heavily on land and, as the remuneration of land falls as described above and noted in the following table, their incomes shrink.

	BASE	Sim 1 Crop	Sim 2 Live- stock	Sim 3 Indus- try	Sim 4 Ser- vices	Sim 5 All Sec- torS
Medium-large farms	241.7	-2.4	1.6	2.2	6.7	9.6
Small-dry farms	67.0	1.7	0.3	2.0	2.8	8.8
Agricultural wage laborers	48.0	4.3	1.6	3.0	-2.4	8.9
Non-farm poor	38.0	3.9	1.5	2.3	-0.7	9.3
Non-farm non-poor	66.2	3.8	1.7	1.6	-0.3	8.9
Urban poor	37.0	2.6	1.4	1.0	2.2	9.3
Urban non-poor	158.8	2.2	0.8	-2.3	8.3	9.0
Total	81.2	2.2	1.0	0.3	4.3	9.0

Source: Model simulations

PRODUCTIVITY GROWTH IN THE FRAMEWORK FOR ECONOMIC GROWTH

We extend our analysis by first using actual historical growth rates by sector instead of a constant 10 percent productivity growth rate across sector (Simulation 6). We then simulate the major thrust of the Framework for Economic Growth, accelerating productivity growth in industry and services to make their productivity growth rates double the recent historical rates (Simulation 7). Finally, in Simulation 8, we simulate the effects of adding higher productivity growth in agriculture to the accelerated productivity growth in industry and services in the previous simulation.

GDP Growth

In the case of Simulation 6 (historical productivity growth rates followed over the next five years), growth in the economy, measured by value-added in real terms, increases by a total of 6.2 percent, with industry growing slightly more than the other sectors (6.8 percent vs. 6.0 percent). With investments targeted to non-agricultural sectors (Simulation 7), the economy grows 10.6 percent, with industrial and services production growing significantly more (10.9 and 12.1 percent respectively), but some spillover to the primary sector is seen (as it grows 6.3 percent instead of 6.0 percent). Finally, with economy-wide investments (Simulation 8), each sector (primary, industry, and services) grows by an average yearly growth of 2.3 percent and more than 12 percent for the five-year period under consideration.

Table 1—Change in Value-Added in Real Terms

(Base in billion rupees, rest in % changes)

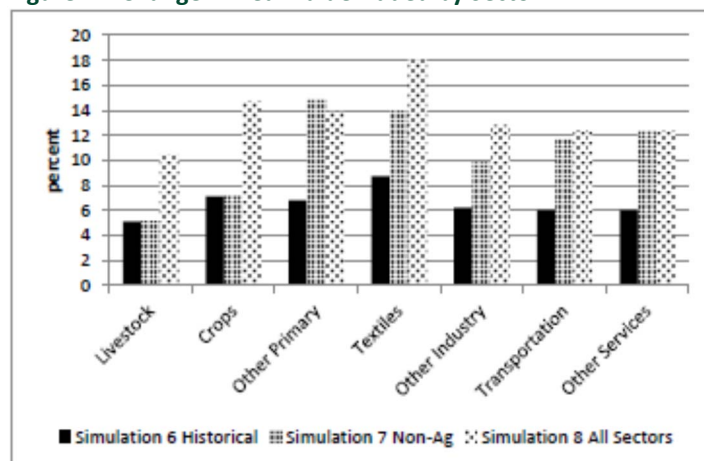
	BASE	Sim 6 Historical	Sim 7 Non-Agriculture	Sim 8 All Sectors	Effect of Agric. Productivity Gain
TOTAL	9922.0	6.2	10.6	12.6	2.0
Primary	2017.0	6.0	6.3	12.4	6.1
Industry	2252.0	6.8	10.9	13.9	3.0
Service	5652.0	6.0	12.1	12.2	0.2

Source: Model simulations

The following figure disaggregates the economy into seven sectors. Overall, it suggests that each sector grows faster with economy-wide investments than from investments focused on non-agriculture, a point that is particularly prominent for textiles, which grows four additional percentage points when agricultural productivity rises along with industry and services.

The productivity increases in the historical simulation allow wages to increase from 6.2 percent (non-agricultural capital) to 7.6 percent (livestock). With non-agricultural investments, the wages of each factor (or, labor category) grow, but wages of factors linked to agriculture (where relative prices increase) increase more. Finally, with country-wide investments, as relative prices do not move significantly, the wages of all production factors increase more homogeneously, in the range of 12.8–15.5 percent.

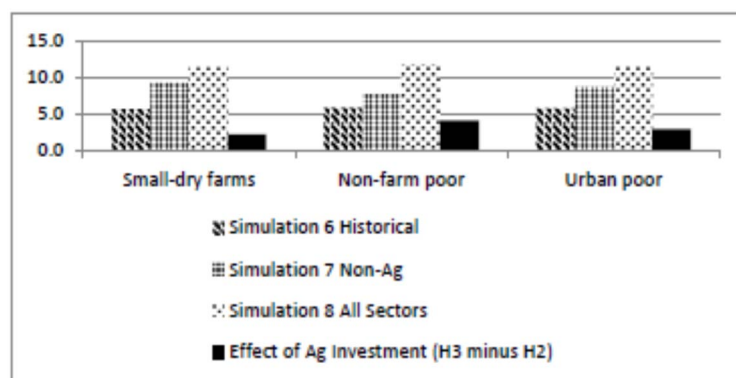
Figure 2—Change in Real Value Added by Sector



Source: Model simulations

Household incomes are primarily composed of factor income, so that the changes in wages described above shape variations in household incomes. In the non-agricultural investments simulation, household per capita incomes increase by 9.3 percent on average, with medium and large farms, and the urban non-poor, enjoying much higher increases than the poor (11.7 percent for medium-large farms and 10.3 percent for urban non-poor, compared to 6.7 percent for agricultural wage laborers, 7.6 percent for non-farm poor, and 8.6 percent for urban poor). Country-wide investments lead to household income increases that are much more homogenous, in the 11.2–12.6 percent range for each of the household groups.

Figure 3—Household per Capita Income (% Change)



Source: Model simulations

CONCLUSIONS

Over the past two decades, Pakistan has achieved steady, though not rapid, economic growth, with real GDP growth averaging 4.3 percent in the 1990s and 5.4 percent in the 2000s. Under the new Framework for Economic Growth, productivity and economic growth are expected to increase further through additional development of markets and increased efficiency of government. The Framework also places substantial emphasis on vibrant cities as engines of growth, with relatively less emphasis on the rural economy. This implicit distribution of growth in productivity and output across sectors, however, has significant implications for distribution of the economic gains.

Increased productivity in the non-agricultural sector has been a potent source of growth in the past decade and further gains in productivity would have positive effects on growth and household incomes. However, our simulations show that accelerating agricultural growth as well would result in even greater overall economic growth, with an additional 2.6 percent gain in average

household income. Moreover, accelerated agricultural growth has a large positive effect on real incomes of poor household groups, raising average real incomes of agricultural wage laborers and the rural non-farm poor by an additional 4.0 to 4.5 percent, as agricultural growth spurs rural non-farm output and incomes. Real food prices also decline in this scenario, benefitting food-deficit urban poor and poor rural non-farm households.

The results presented in this paper strongly suggest that, while productivity growth concentrated in non-agricultural sectors has substantial benefits in terms of increased total output and incomes, agricultural productivity growth remains essential for rapidly reducing poverty in Pakistan. Thus, developing agricultural and rural labor markets (as part of **the efforts to develop markets**) **and increasing the** efficiency of government institutions involved in raising crop and livestock productivity have the potential to ensure that accelerated economic growth in Pakistan results in major welfare benefits for the poor.

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