Transformation of the Agri-Food System in Pakistan and Contributions of Wheat Value Chain

ADB Rural Transformation Project

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Objectives

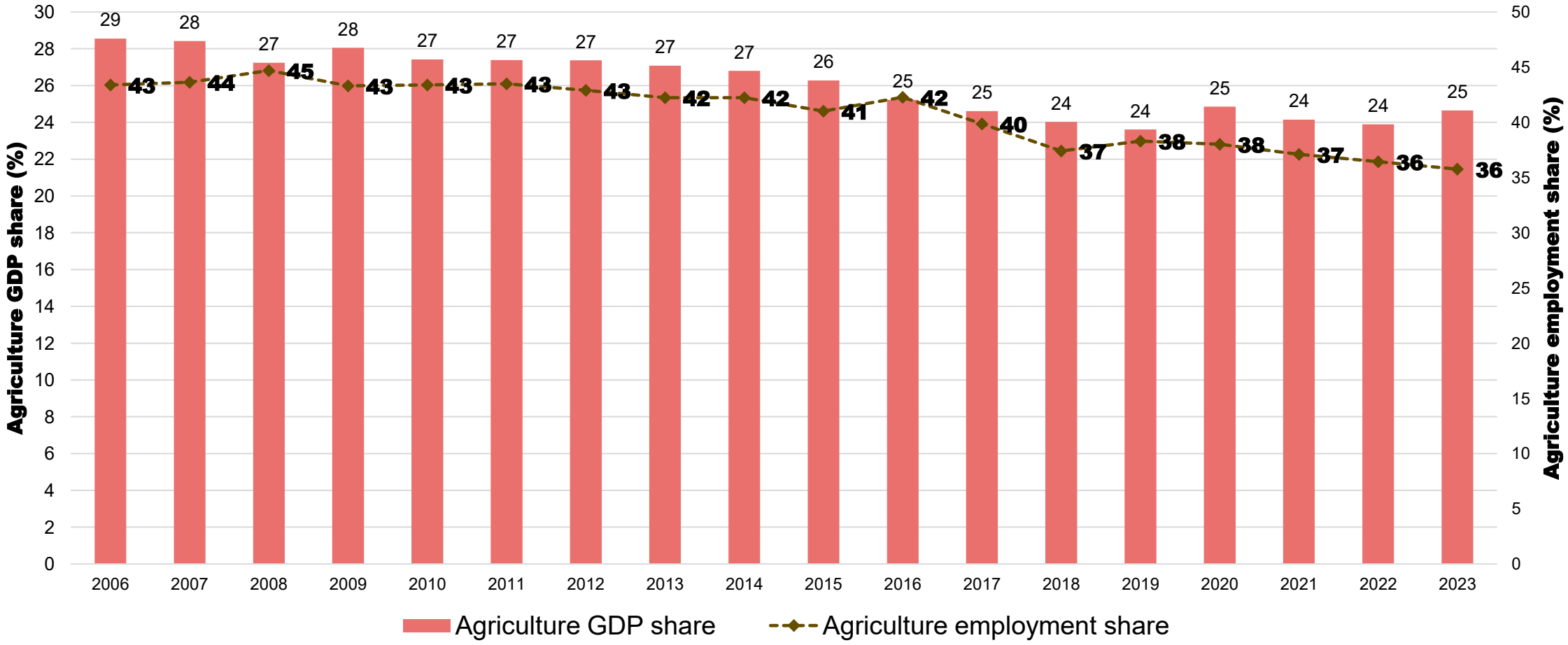
- Illustrate results from the Rural Transformation Project
- Pull stakeholder input on key aspects of Rural Transformation

  → Wheat Procurement and Climate Change
- Different Aspects of Wheat Markets

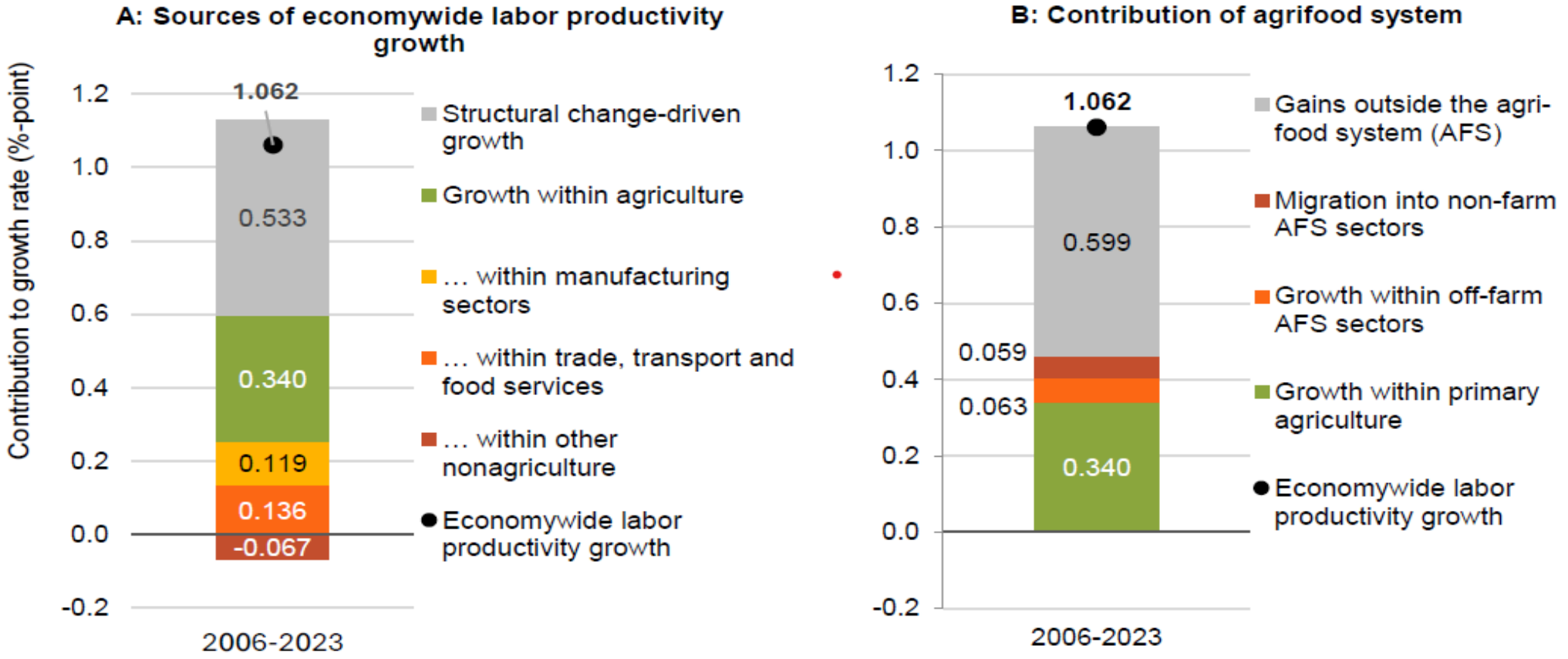
  - Structure, Pricing and Trade, Storage, and Finance

  - Link back to Rural Transformation

Falling share of Employment in Agriculture

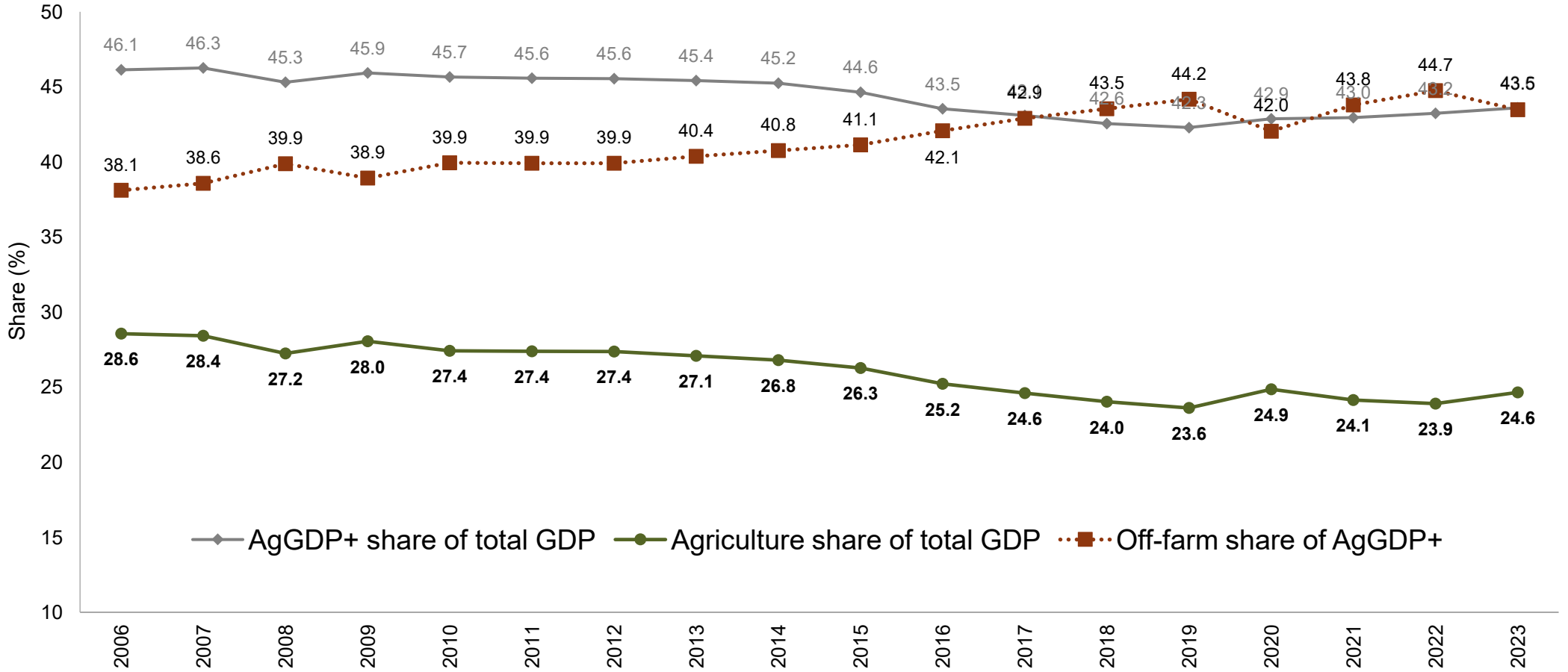


Decomposition of Average Annual Labor Productivity Growth Rate, 2006-2023. (Based on Diao and Thurlow 2024)



Source: Authors' analysis using the 2006 – 2023 Social Accounting Matrixes for Pakistan (IFPRI forthcoming).

Changing Shares of GDP in the Agrifood System
(Based on Diao and Thurlow 2024)

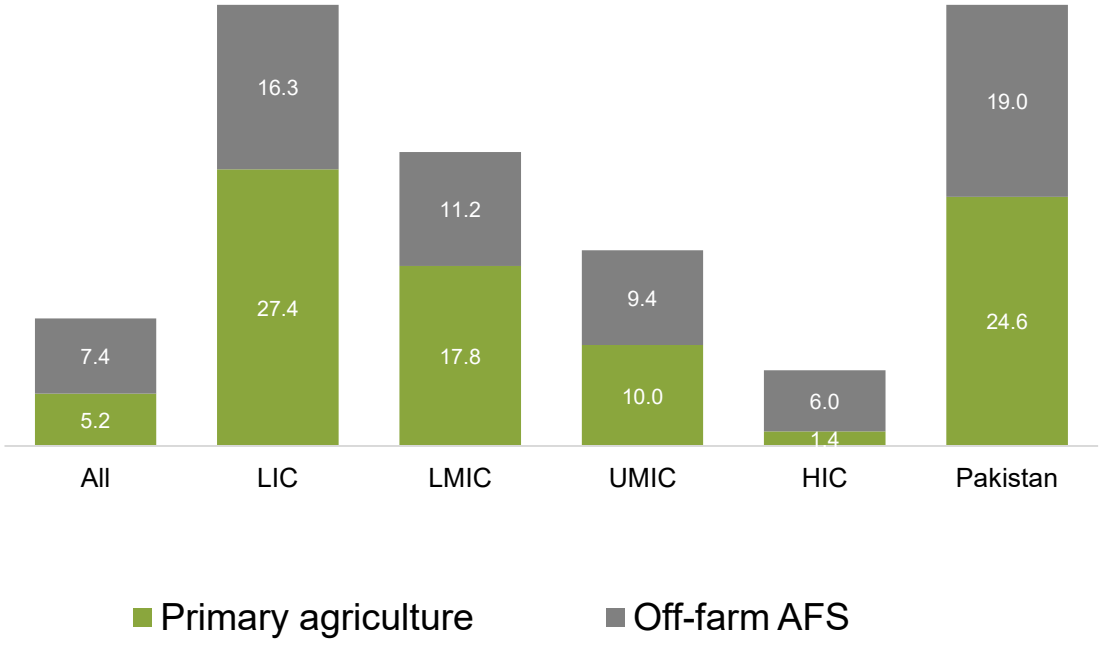


The Pakistan Economy with an Agrifood System Focus
(Diao and Thurlow 2024)

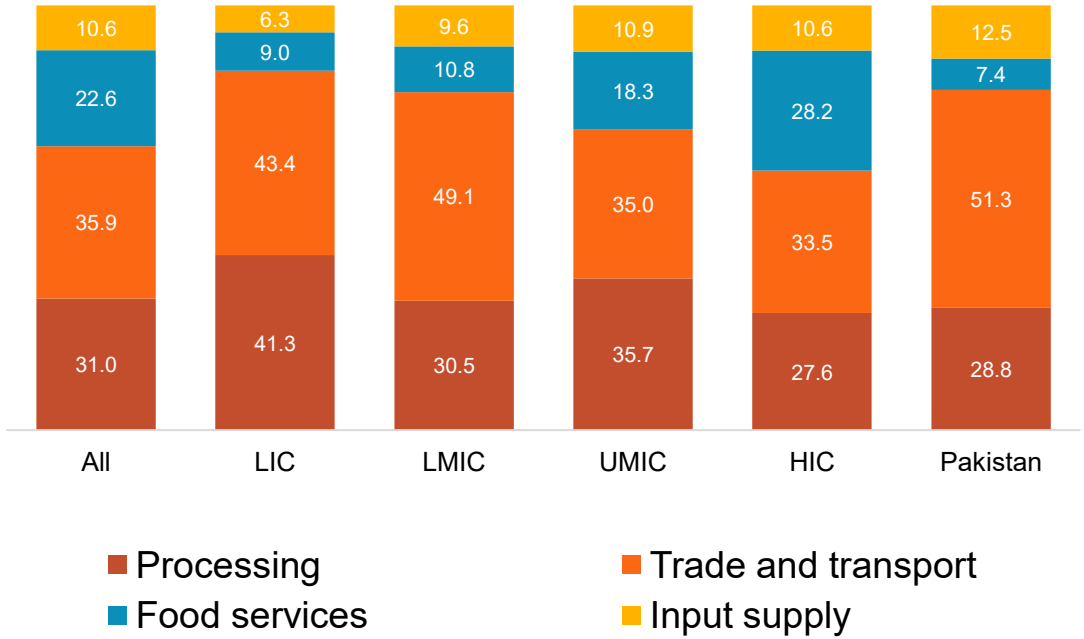
	GDP	Employment
	Share (%)	Share (%)
Total economy	**100**	**100**
Agrifood system	**43.6**	**50.3**
Primary agriculture (A)	**24.6**	**35.8**
Off-farm AFS	**19.0**	**14.6**
Processing (B)	5.5	4.3
Trade and transport (C)	9.7	7.4
Food services (D)	1.4	1.9
Input supply (E)	2.4	1.0
Rest of economy	**56.4**	**49.7**

Country Group Comparisons of Components of the Agrifood System (Diao and Thurlow 2024)

A: Shares of Agricultural and off-farm AFS GDP in total GDP (%)

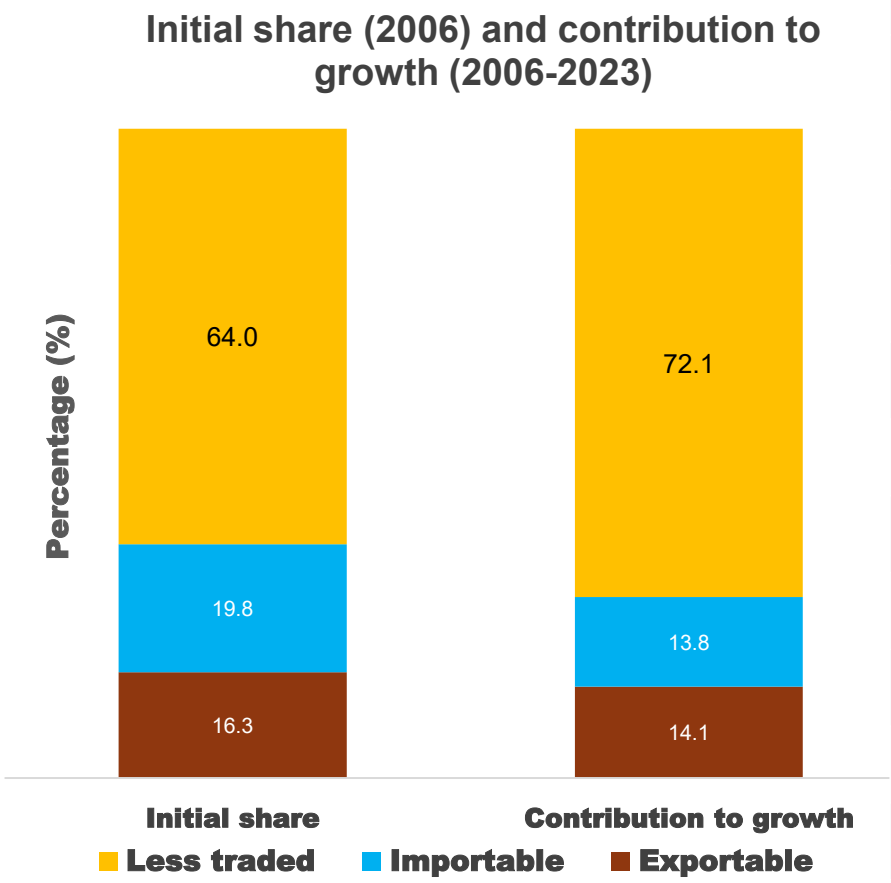


B: Shares of off-farm components in AFS GDP (%)



Although Pakistan best compares with the Lower Income Countries, the share of 'Trade and Transport" remains much higher.

Pakistan's Agrifood System Composition by Trade Orientation of Value Chain (2023)



	Share of GDP (%)		
	AFS (AgGDP+)	Primary agriculture	Off-farm AFS
Exportable	**15.4**	**14.9**	**16.1**
Rice	6.6	4.9	9.1
Fruits and nuts	5.5	7.2	3.0
Maize	1.7	1.6	1.9
Importable	**17.4**	**7.7**	**31.1**
Oilseeds and edible oils	9.0	1.6	19.5
Other crops	5.6	3.7	8.3
Pulses	0.8	0.3	1.6
Less traded	**67.1**	**77.4**	**52.7**
Meat	16.4	17.4	15.1
Milk and eggs	30.2	40.6	15.6
Wheat	9.8	6.0	15.2
Vegetables	10.7	13.4	6.8

Pakistan's Agrifood System Composition by Trade Orientation of Value Chain (2023) – Growth Rates

	Average annual GDP growth rate (%)			
	Total AFS	Primary Agriculture	Off-farm AFS	Agro-processing
Exportable	**2.6**	**1.9**	**3.7**	**3.2**
Rice	2.9	2.1	3.6	3.1
Fruits and nuts	1.9	1.5	3.6	3.3
Maize*	4.3	3.7	5	3.9
Importable	**2.2**	**0**	**3.2**	**3.4**
Oilseeds and edible oils	2.2	-3.3	3.4	3.5
Other crops*	3	2.1	3.7	3.3
Pulses	0.5	-3.1	2.2	3.3
Less traded	**3.2**	**2.9**	**4.1**	**4**
Livestock and meat	2.8	1.5	5.8	6
Milk and eggs*	4.3	4.3	4.2	3.3
Wheat	1.8	0.6	2.6	2.5
Vegetables	2.8	2.3	4.6	3.3

Key Takeaways and Discussion Points

- Push and Pull Factors
- Better on average
- Transport costs and Input inefficiencies

- In terms of rural transformation, what are areas of entry to encourage positive aspects?
- What was the most surprising insights of this section?
- What was the least believable part of this section?

Wheat Storage, Marketing, and Pricing

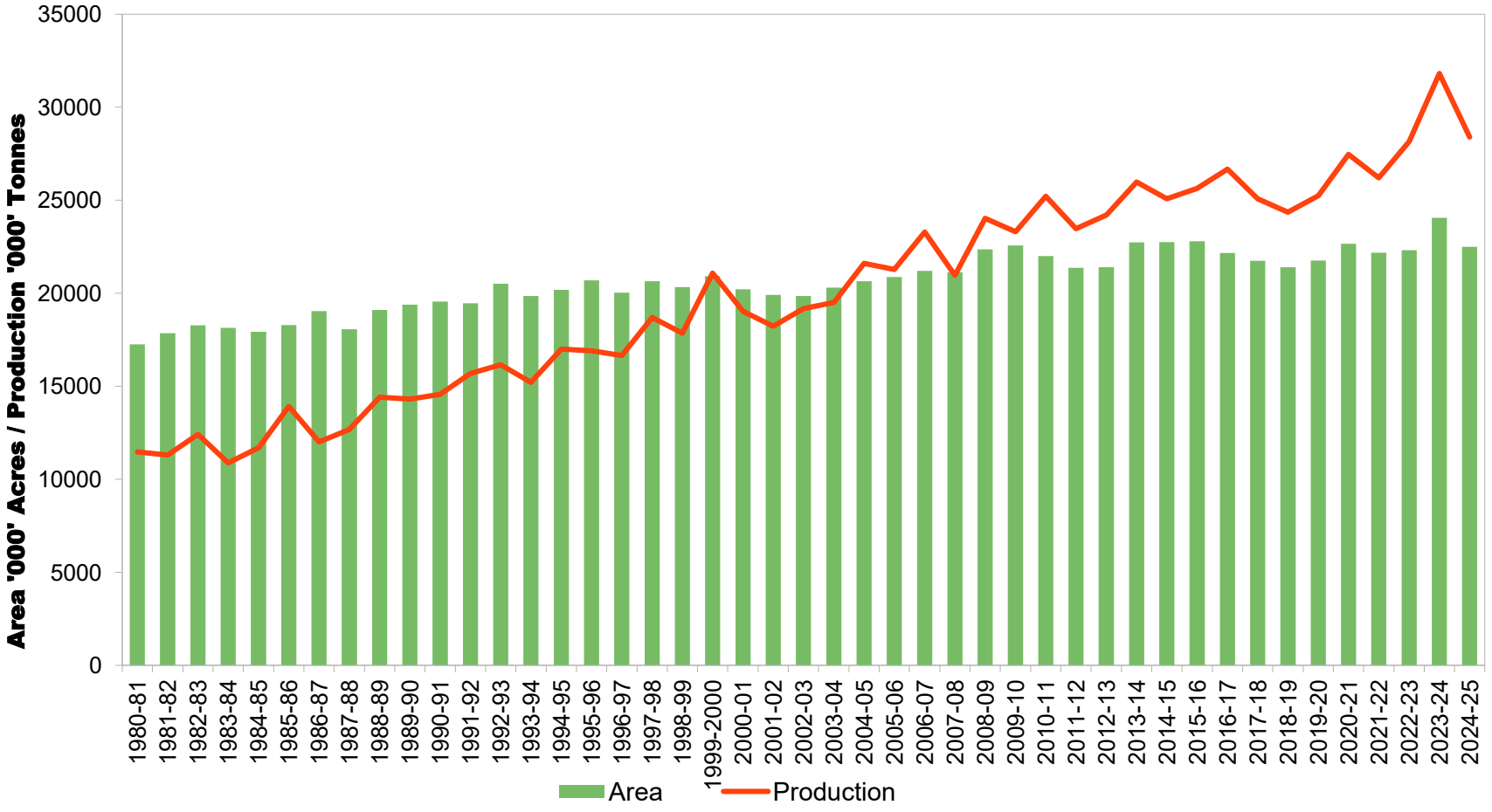
Background

- Punjab Government's sudden decision to discontinue wheat procurement in 2024 left farmers without a reliable market or reference price
  - This year's harvest is down 11% (but from a high harvest) and the government released old wheat at harvest in April and May; wheat prices are currently around PKR 2200 to PKR 2400.
  - Some procurement will continue for strategic reserves but without support prices.
  - Remarkably, the buying side of the wheat market has held up, perhaps on expectations of higher prices in the Fall.

Linkages of Wheat with Overall Rural Economy

- Wheat → key crop in the rabi season, shaping land use and input demand.
- Support price policies historically have directly impacted farmer earnings and planting decisions.
- Access to markets (traditional (aartis) or modern) shape farmer margins and rural trade dynamics.
  - Smaller farmers usually sell at farm-gate to middlemen / commission agents
  - Government procurement program is believed to have served larger farmers.
- Wheat output is often collateral for informal and formal credit, affecting investment in both farm and off-farm activities.
- A strong or weak wheat season ripples into other parts of the economy, including retail and services in rural areas.

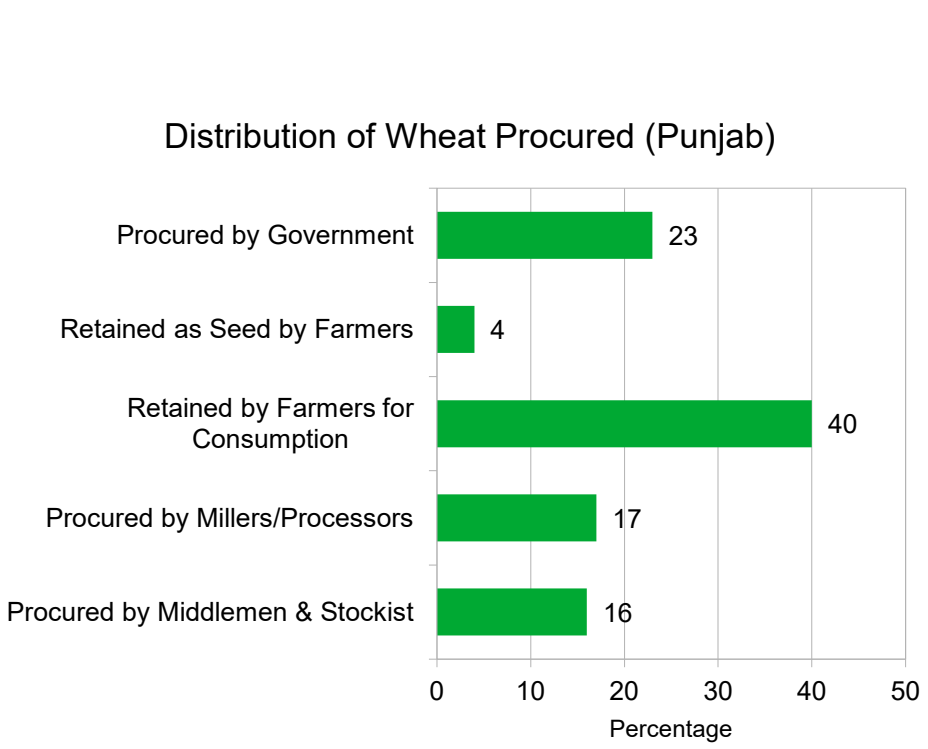
Wheat Area and Production in Pakistan



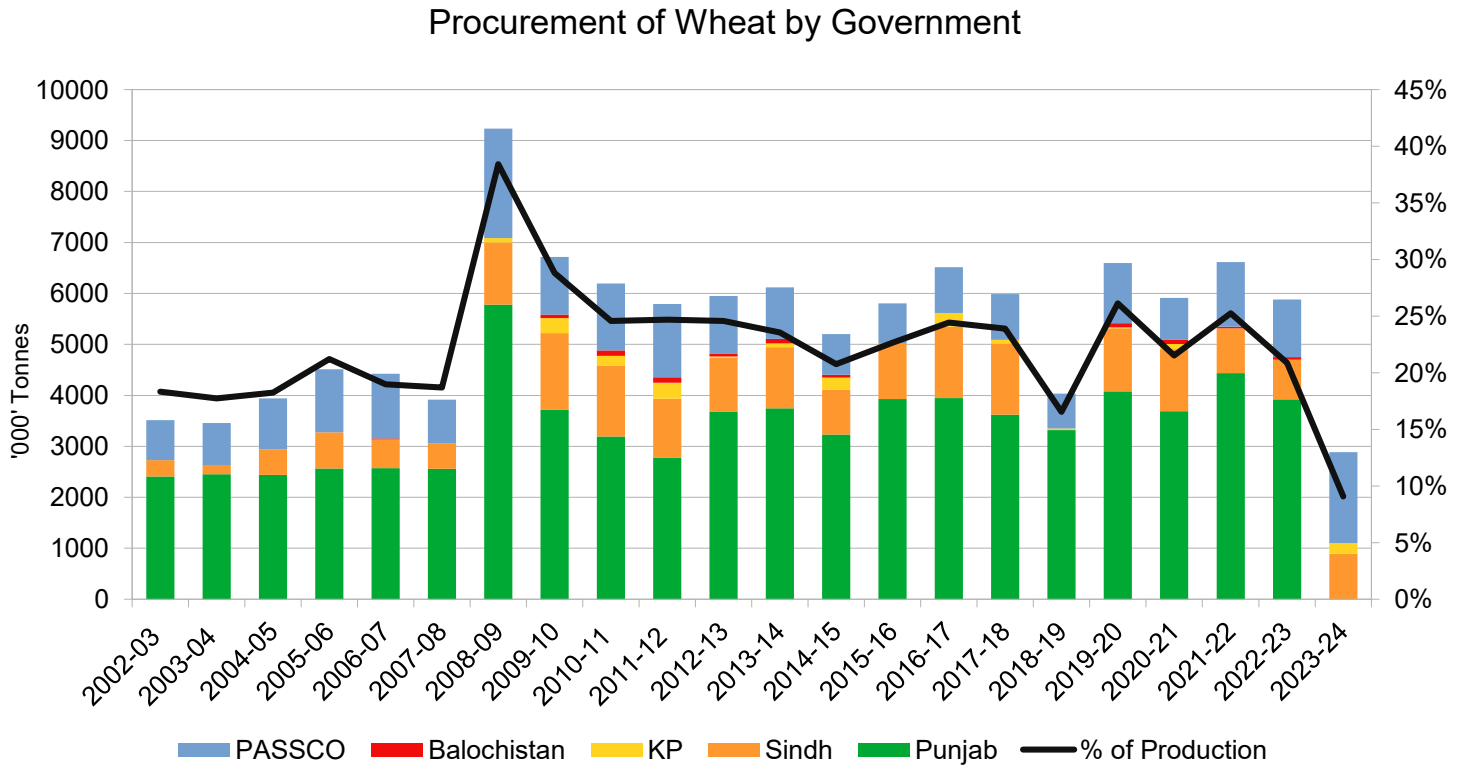
	Area (000 acres)	Production (000 T)
2021-22	22182	26209
2022-23	22321	28161
2023-24	24055	31815
2024-25	22490	28400

Source: Agriculture Statistics of Pakistan, various editions

Trends in Wheat Procurement



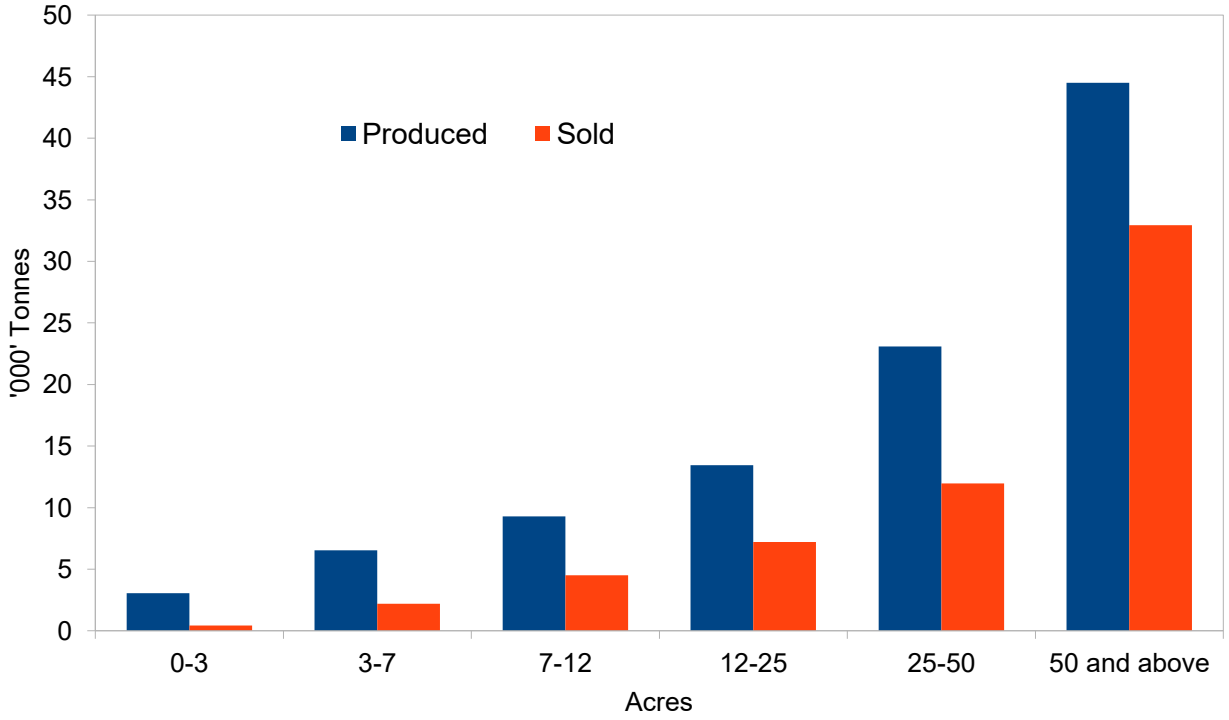
Source: IFC



Source: Agriculture Statistics of Pakistan

- Historically the government procured about 20-25% of wheat each season. However we expect that to come down to 10% for strategic reserves only.
- This leave on average 13% to be absorbed by other actors in the system. Finance is an issue.

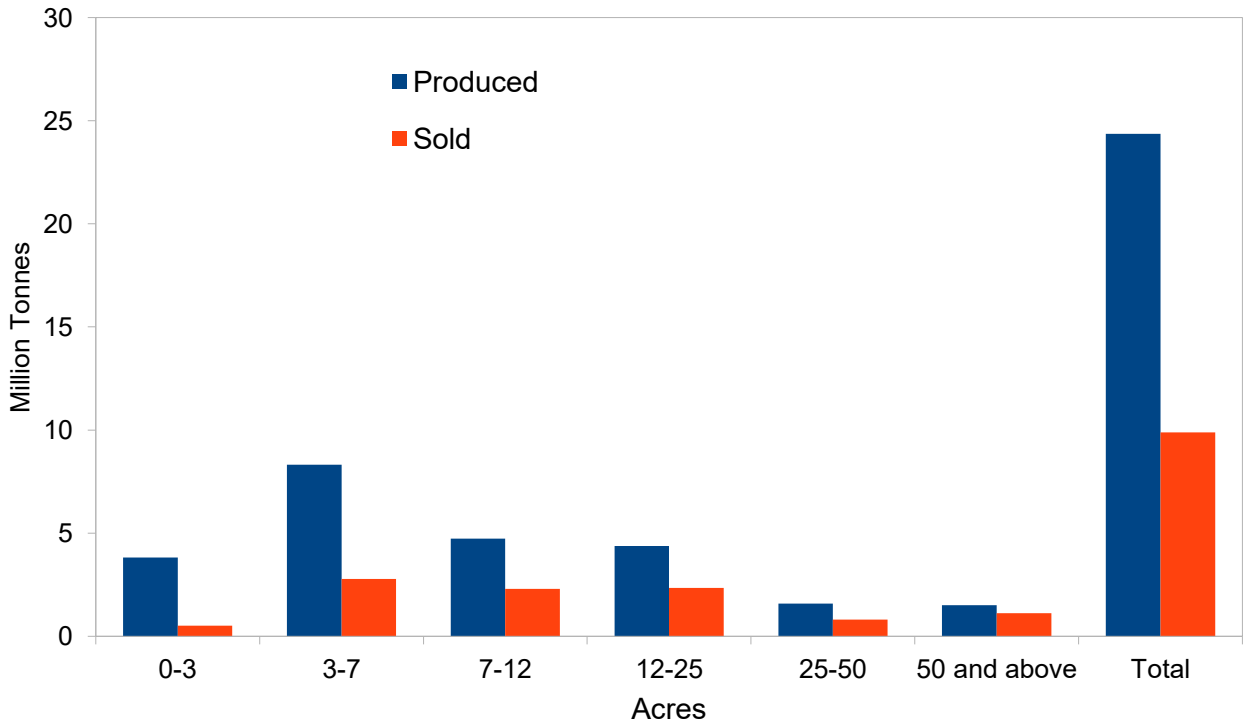
Average Quantity of Wheat Produced and Sold, by Farm Size

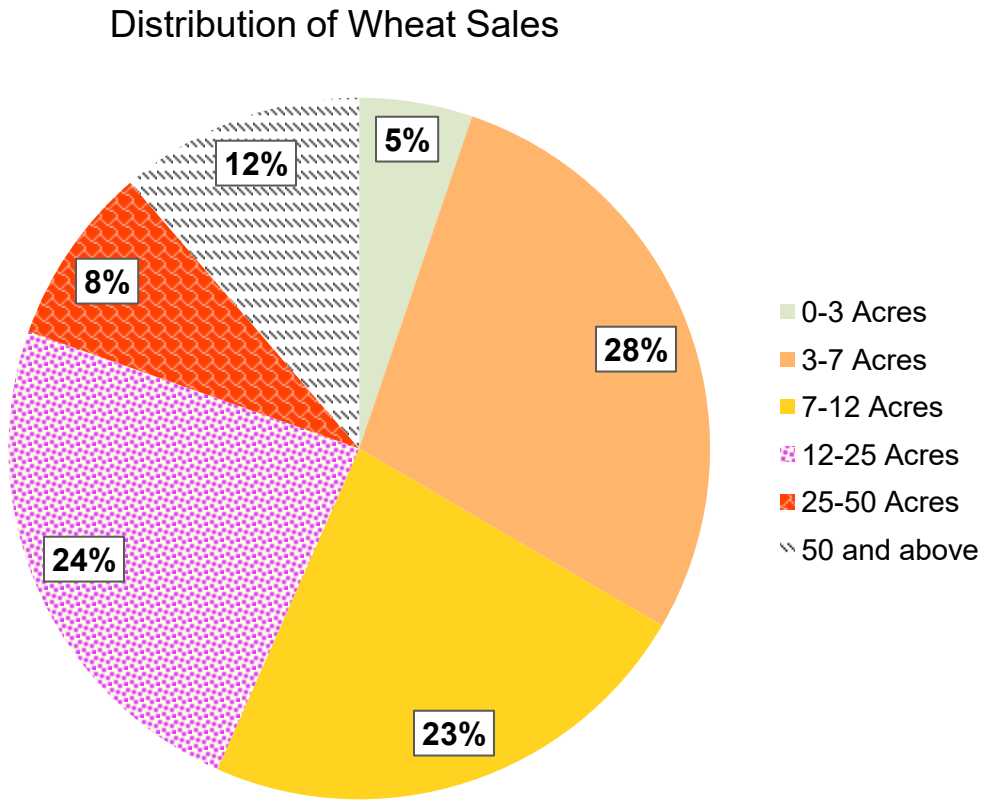


	Wheat Sold (RHPS)	Total Land Operated (HIES)
0 to 3 Acres	13.5%	11.1%
3 to 7 Acres	33.5%	29.3%
7 to 12 Acres	48.4%	19.8%
12 to 25 Acres	53.6%	20.4%
25 to 50 Acres	51.8%	%9.7%
50 and above	74%	%9.6%

Source: Based on production data from HIES 2018-19
Data on percentage of wheat sold from PRHPS Round 3.5 (2014)

Total Quantity of Wheat Produced and Sold, by Farm Size





Source: Based on production data from HIES 2018-19
Data on percentage of wheat sold from PRHPS Round 3.5 (2014)

Collectively, farmers with less than 12.5 acres land make up 56% of the wheat sold

Structure of the Wheat Market

To understand the effects of policy changes and investments in the wheat market, a brief overview is provided:

- Nearly 1/4 of wheat production was purchased by the government in most years and about 40% is retained by farmers for home consumption and seed use;
- Millers and Commission agents by about 16-17% of total production each but this amounts to nearly 60% of the proportions sold;
- Finance is an issue as government and miller purchases do not involve extending credit. Smaller farmers, surprisingly, supply more than 50% of the sales
- Small and medium farms more often sell to Commission agents

Schematic of Rural Transformation through the Wheat Value Chain

Small and Traditional Farmers	Medium Sized Farmers	Larger Farmers
- Produce mainly for home consumption. Sell surplus. - Little Individual contribution, major collective contribution of wheat in the market. - less integrated into the market - Normally sell to middlemen / commission agents.	- Market oriented. - Better market access than smaller farmers.	- Produce for commercial markets. - Better market access. Historically better positioned to benefit from government procurement. - Will drive success of the EWR and modern system

Mentimeter

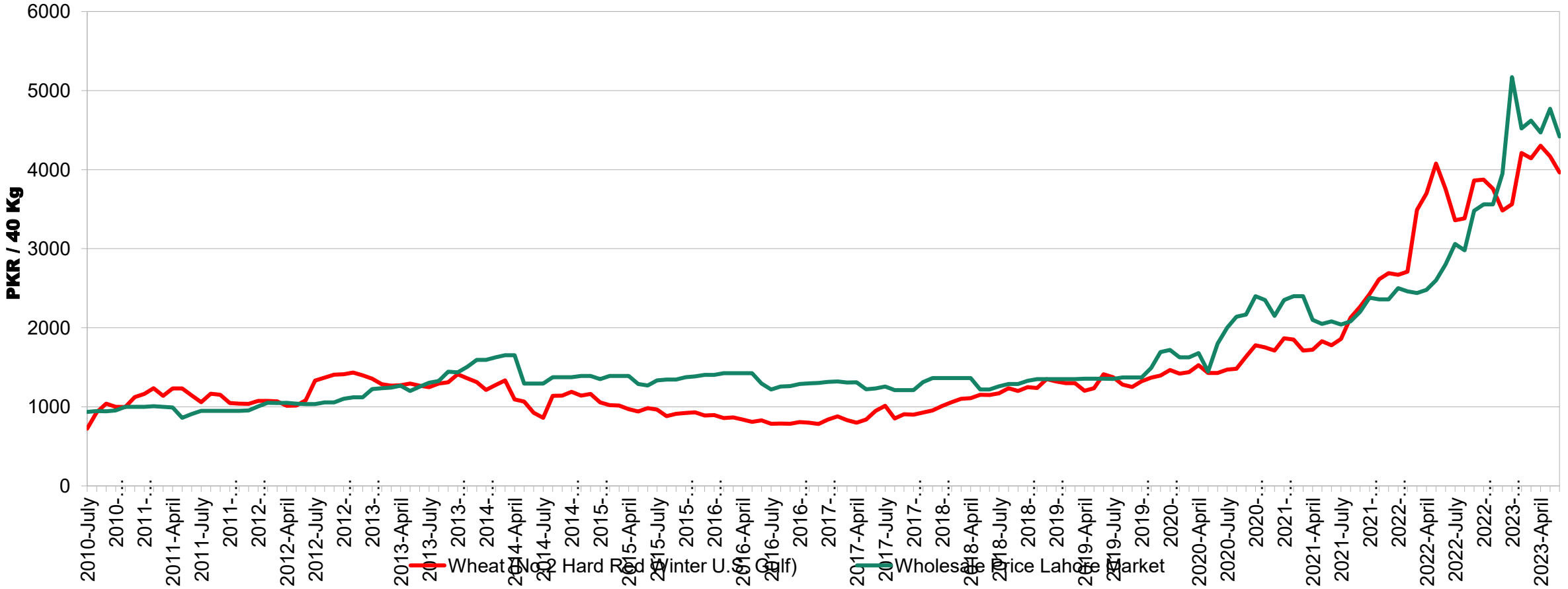
Pricing

Pricing and Trade Issues

- The procurement price offered a degree of predictability but led to missed profits and excess consumer costs at times.
  - Without this price anchor, market prices fluctuate more freely, leading to heightened price uncertainty
- Private investments in storage require that market prices cover costs of storage throughout a season.
  - How close is Pakistan to a profitable seasonal price pattern when prices have been managed so much by the procurement program?

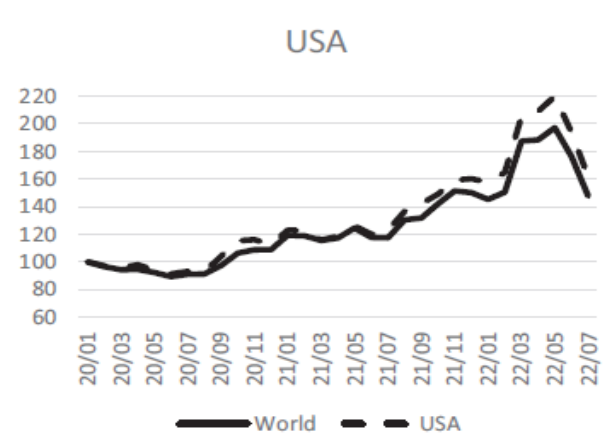
- There will be more exposure to international price fluctuations

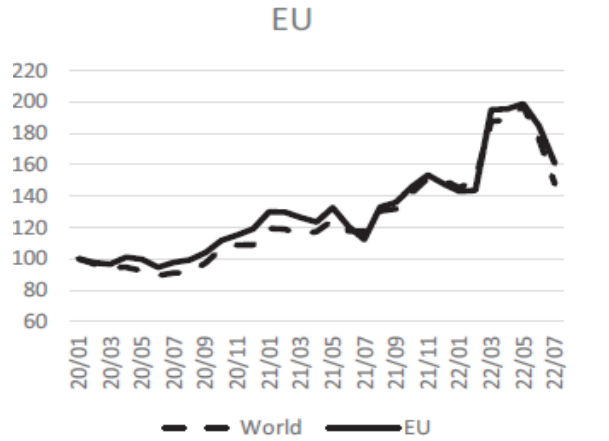
Monthly Wheat Prices 2010-2022

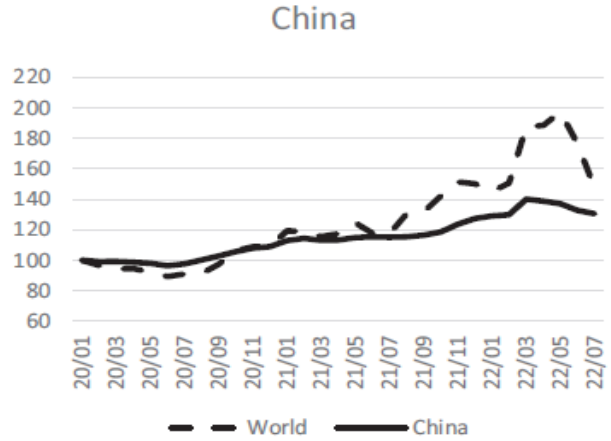


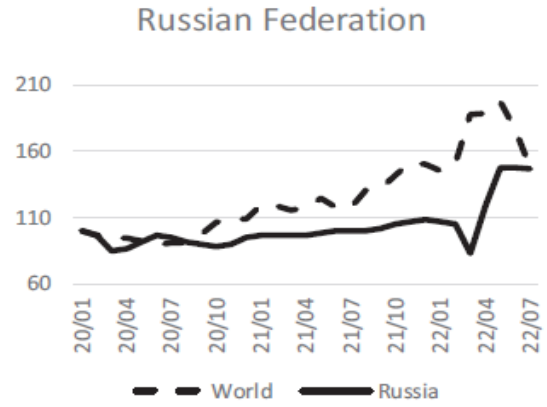
Domestic Prices: Agricultural Statistics of Pakistan
International Prices: Agriculture Marketing Information Service (AMIS) http://www.amis.pk/Reports/InternationCommodityPriceReports.aspx
Exchange Rates : State Bank of Pakistan

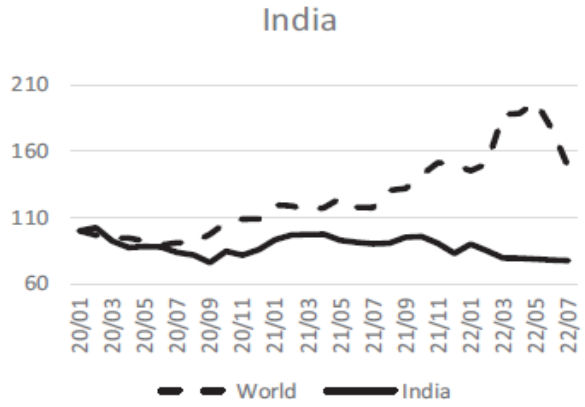
International vs. Domestic Prices – Price "Insulation" in recent years for Pakistan

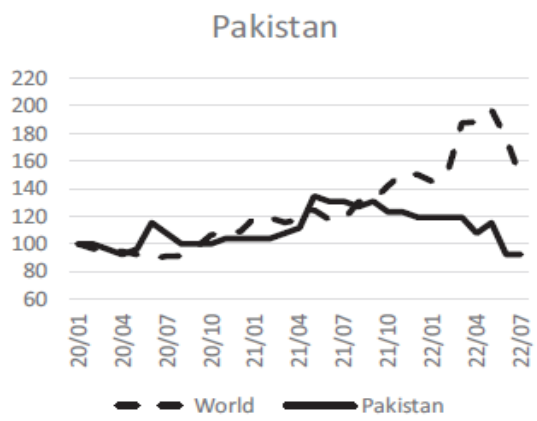






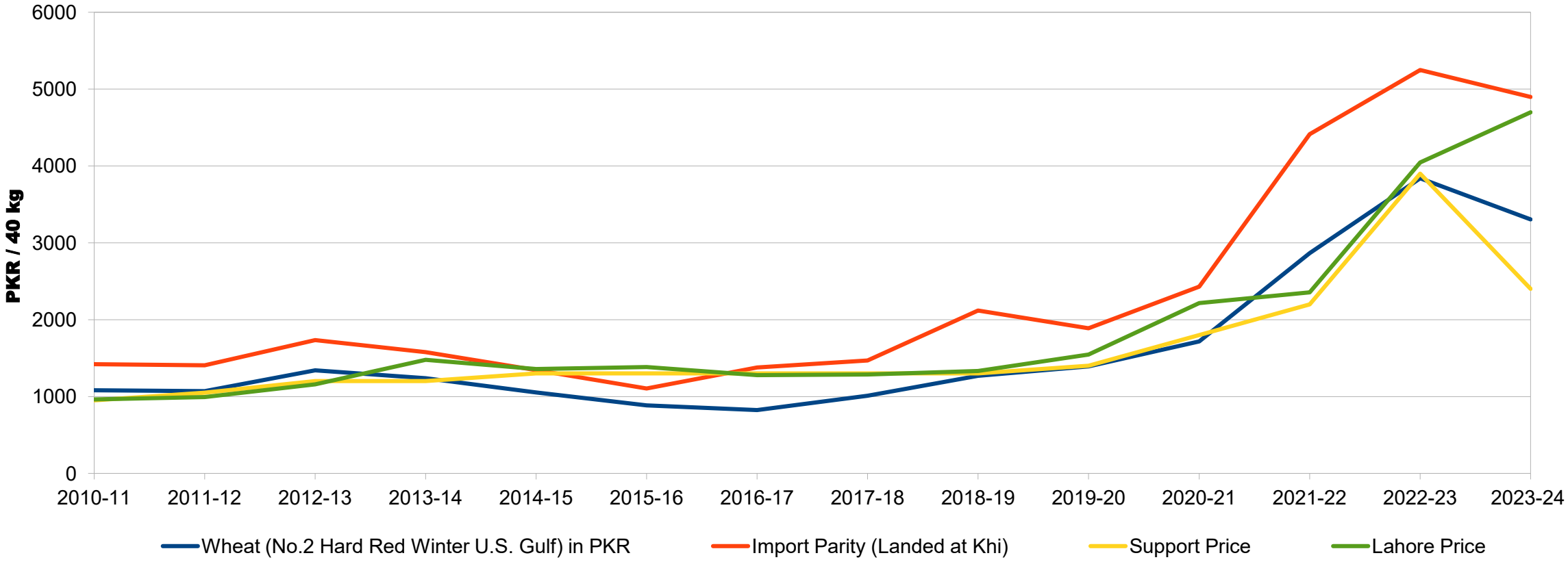






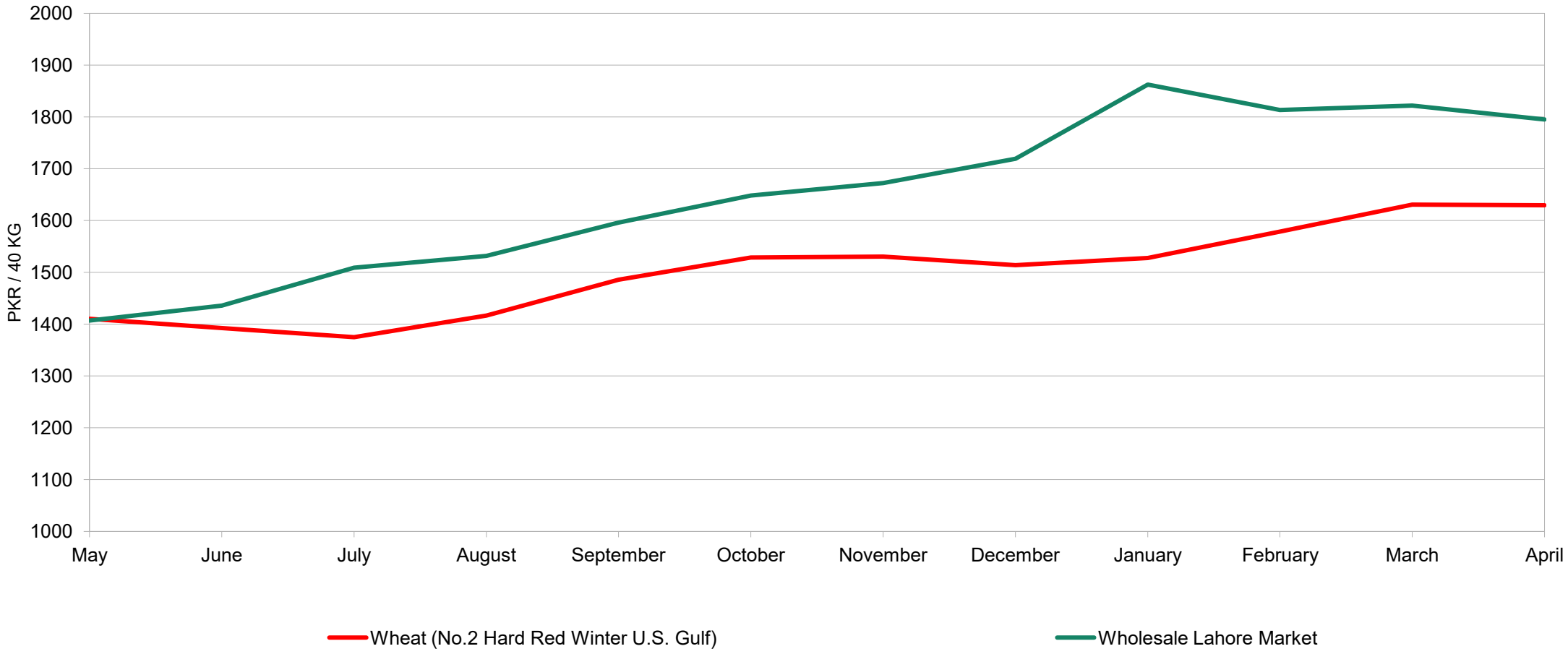
Martin, W. & Minot, N. (2022) The impacts of price insulation on world wheat markets during the 2022 food price crisis. *Australian Journal of Agriculturaland Resource Economics*, 66, 753–774. Available from: https://doi.org/10.1111/1467-8489.12498

Import Parity 2011-2024*



* 2023-24 price if from July to September
Domestic Prices: Agricultural Statistics of Pakistan
International Prices: Agriculture Marketing Information Service (AMIS) http://www.amis.pk/Reports/InternationCommodityPriceReports.aspx
Exchange Rates : State Bank of Pakistan
Import Parity Prices: Agriculture Policy Institute (API) Wheat Policy Analysis (Various Issues)

Price Seasonality - Average Monthly Wheat Prices 2010-2022



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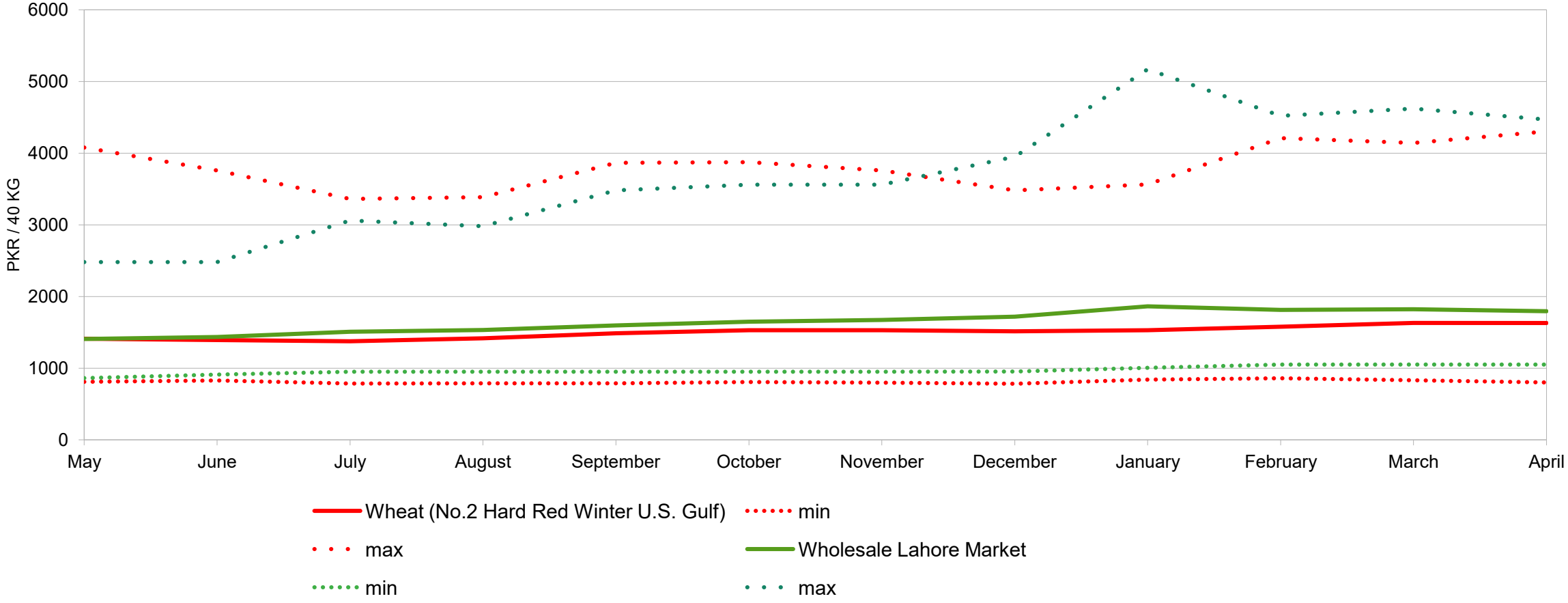
Price Seasonality – Minimum, Maximum & Average Monthly Wheat Prices 2010-2022



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Monthly Change in Wheat Price – Can there be returns to storage?

	Monthly Price Change			Price Change WRT Harvest (May)		
	Lahore PKR	**International PKR**	**International USD**	**Lahore PKR**	**International PKR**	**International USD**
June	2.04%	-1.28%	-2.83%	2.04%	-1.28%	-2.83%
July	5.11%	-1.25%	-2.24%	7.26%	-2.51%	-5.01%
August	1.50%	3.04%	2.61%	8.87%	0.45%	-2.53%
September	4.20%	4.87%	2.23%	13.44%	5.34%	-0.35%
October	3.27%	2.90%	2.42%	17.16%	8.40%	2.06%
November	1.47%	0.10%	-0.29%	18.88%	8.51%	1.76%
December	2.79%	-1.08%	-1.80%	22.20%	7.34%	-0.07%
January	8.33%	0.91%	-0.08%	32.37%	8.32%	-0.14%
February	-2.62%	3.35%	0.21%	28.90%	11.95%	0.07%
March	0.47%	3.29%	2.10%	29.50%	15.63%	2.17%
April	-1.47%	-0.08%	-2.40%	27.60%	15.54%	-0.29%

What conditions need to be met for there to be ample returns from storage and a competitive storage system?

- The marginal conditions required to store wheat in a competitive storage market are summarized below:

$$x_t \geq 0, \text{ if } \left(\frac{1-\delta}{1+r}\right) E_t(p_{t+1}) = p_t + k,$$

$$x_t = 0, \text{ if } \left(\frac{1-\delta}{1+r}\right) E_t(p_{t+1}) < p_t + k,$$

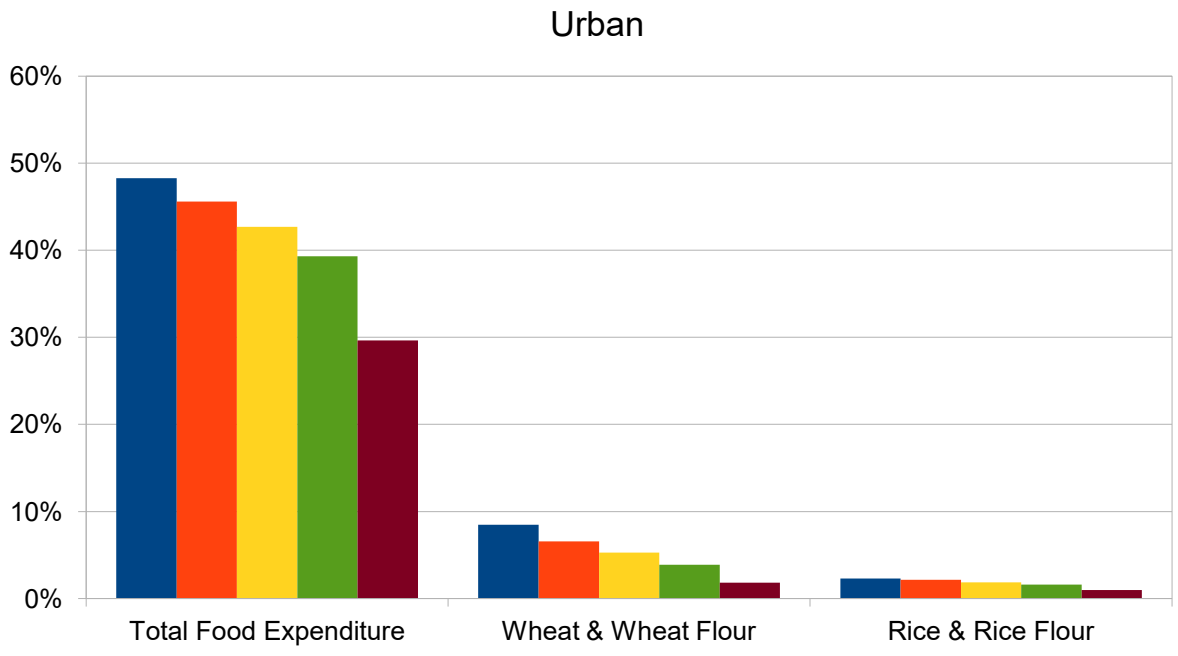
- Storage in time t (xt) is positive if the expected change in price (Et(pt+1)) after losses in storage (δ) and interest costs (r) exceed the current price plus added costs k.
- It will be 0 otherwise.

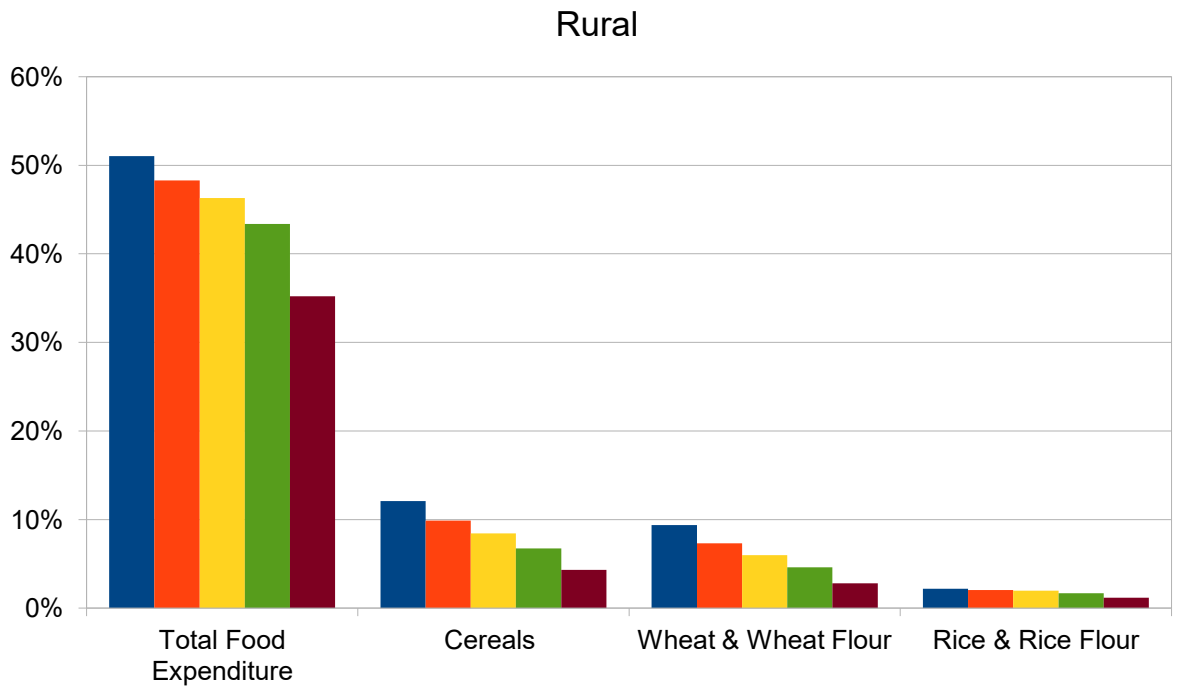
- **Taking losses as constant, if interest rates are high, expected price in Fall needs to be higher for it to be profitable to carry forward stock**.
- In Pakistan, interest rates are high and forming expectations (Et(pt+1))in the absence of support prices will be more challenging, so careful thought about how to make this work is needed.
- Factors to consider: Markup on loans, Warehouse deduction and, Agri-collateral manager charge, deductions at mandi (if sold at harvest)

Key Takeaways

- Seasonal price trends seem to be supportive of of storage investments
- There is always some price volatility
- International prices are not likely to drive domestic prices at present.
  - Times change; development of a futures market will naturally tie to international prices.
  - Development of futures market could also lead to opportunities for arbitrage.

Domestic Prices and Food Security - Food Expenditure as Percentage of Total Expenditure





Source: HIES 2018-19

Diet Intake and Projections

	EAT Lancet		Pakistan (in percentage)		
	Caloric intake Kcal per day	%	2014	2030	2050
Starchy Staples Wheat, Rice	850	34.0	50.8	51.3	47.6
Protein Foods Beef, chicken, poultry, Legumes	726	29.0	4.1	4.3	5.9
Dairy Foods Milk or equivalents	153	6.0	14.2	13.2	13.7
Vegetables All vegetables	78	3.0	3.5	1.3	1.6
Fruits All fruits	126	5.0	2.0	0.8	1.0
Oils & Fats Saturated and Unsaturated oils	447	18.0	14.6	13.7	15.4
Disc. Foods All sugars	120	5.0	10.9	15.4	14.8
Total Calories	**2,500**	**100**	**2,317**	**2,071**	**2,190**

Source: XYZ

Discussion

- If prices remain volatile, what are the steps to manage risk for producers?
  - Forward contracts, electronic warehouse receipts, contract farming etc?

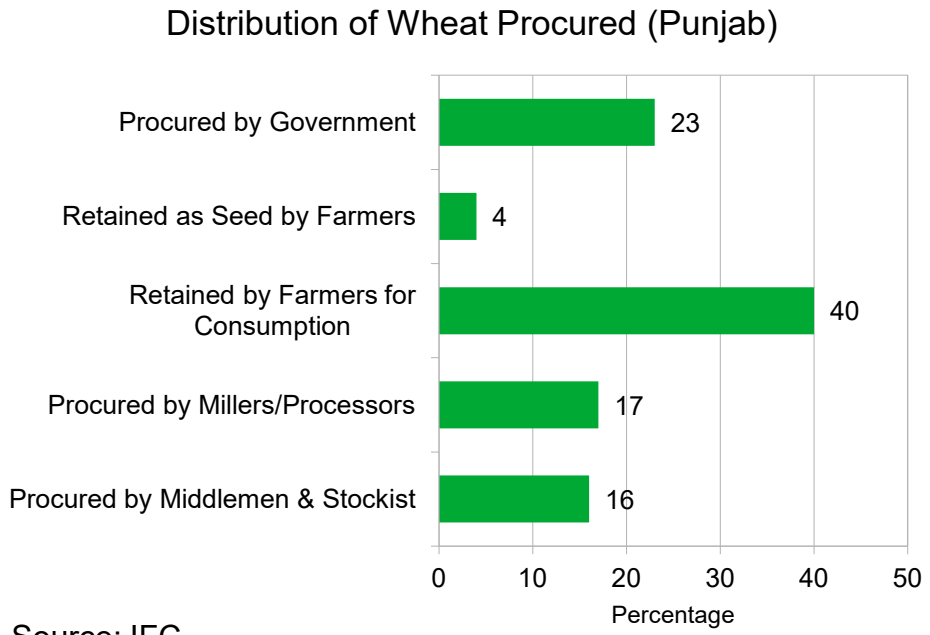
- What measures (if any) should be taken to protect consumers in the face of price shocks? (top three quintiles ; bottom quintile)

- What have support prices done to domestic prices?
- Historically, have there been the returns to storage though rising prices across seasons?
- How will the role of border prices influence / be influenced by rural transformation (role of international prices through market liberalization)?

Mentimeter

Storage and Finance Issues

Revisiting Wheat Procurement and Wheat storage

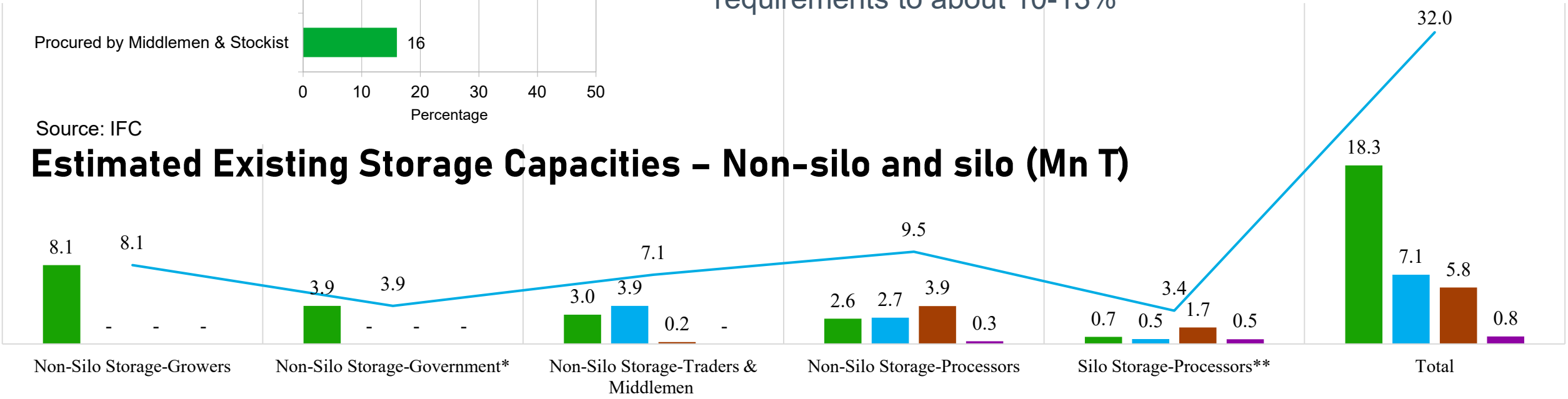


Source: IFC

Under the new policy, the market must now absorb (and store) an additional 25% of wheat, which was previously procured, stored and managed by the government.

Some procurement will be done to maintain strategic reserves, bringing down wheat storage reallocation requirements to about 10-13%

Estimated Existing Storage Capacities – Non-silo and silo (Mn T)



*It includes 1 million t of ganji storage

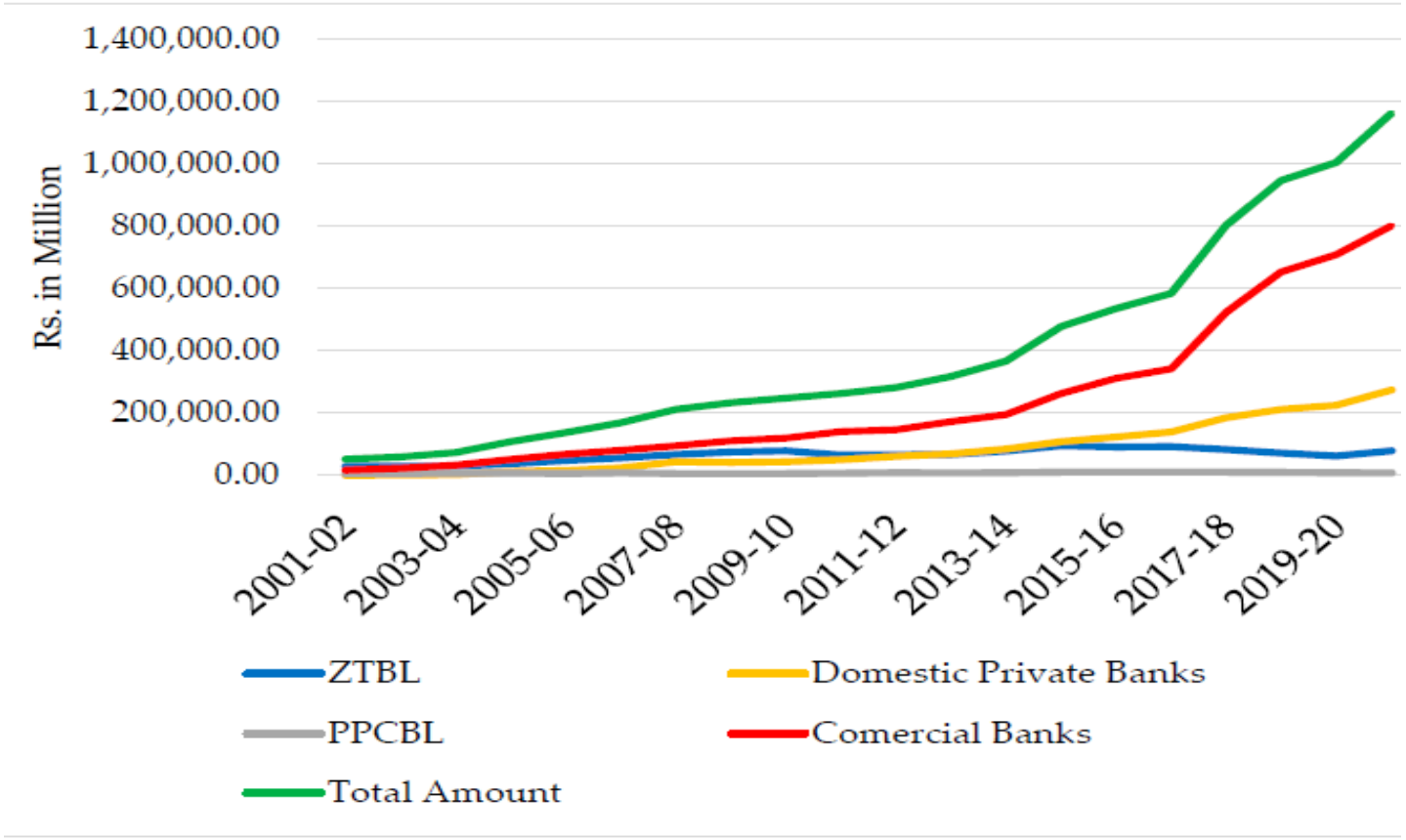
**1) includes silo storage of 228,000 T of the PFD (Punjab Food Department), 2) oil mills also use maize processors' silo storage

Source: IFC

Warehouse Receipts and the Punjab Government Program

- Objectives of the EWRs.
  - Potential benefits from storage in December / January
- Characteristics of farmers likely to access it.
  - Early adopters, late adopters, laggards.
- Registration of Electronic Warehouses..
  - Need to be aligned with adequate quality and capable of managing receipt system.
  - Process needs to be simple.
  - Need for farmer education, and that of other actors in the value chain.
- Punjab Government's program and response.
  - Interesting experiment
  - Test of whether smaller farmers would want to get away from aartis → if there is a surge of small and medium farmers coming to take advantage of this, it indicates that the traditional system and actors are not sufficient.

Finance and Credit Perspectives



Calculations from the 2021 Pakistan Social Accounting Matrix suggested about one third of credit might come from artis and informal sources

Finance and Credit Perspectives

- To what extent is agricultural finance falling short?
  - Formal institutions
  - Traditional aartis / village credit agents
  - Potential to regularize the traditional finance system?
  - Medium to long-term potential for contract farming between millers and medium-sized farms? → potential for forward contracting?

- Prospects for Electronic Receipts.
  - Do they require Silo storage or can we establish a decent EWR with the current storage facilities.
  - Are profits sufficient to attract investment?

Punjab Agriculture Marketing Regulatory Authority Act (PAMRA)

- PAMRA has become established with interest from the private sector. 200+ private markets have been registered
  - PAMRA objectives include investments that raise market productivity, transparency in pricing and better services in storage, grading and pricing of quality differentials.
- So far, limited resources/human capital in the Authority resulted in little control over design and regulation of new private markets, and little investment in innovation.
- Financial situation in the public markets is challenging, as one-third are losing money and two-thirds owe dues to the government.
- Problematically, without adequate oversight and innovative support from PAMRA, the introduction of private markets may lead to even poorer performance.
  - Average throughput per square meter is 15 tons (in Lahore), while in Europe the ratio is 50. Thus, the potential for consolidation in the public APMs may be large.

But PAMRA has been moving forward..

- Outsourcing fee collection (could triple income in some instances) and adding cleaning and some other fees to cover costs.
- Hiring new staff and are trying to attract funds to enhance digitization and promote electronic markets
- Decommissioned 70 private sector markets and have made the standards more demanding so the number of new markets have slowed.
- The notified geographical range of a central market has been abolished. The markets now just have control over the market itself.
  - Middlemen now have more flexibility, and can set up collections markets and operate from other markets
- Relatedly, markets need to raise productivity as average throughput per square meter is 15 tons (in Lahore), while in Europe the ratio is 50. Thus, the potential for consolidation in the public APMs may be large.

Schematic of Rural Transformation through the Wheat Value Chain

Marginal & Small Farmers	Medium Sized Farmers	Larger Farmers
- Produce mainly for home consumption. Sell surplus. - Little Individual contribution, major collective contribution of wheat in the market. - poorly integrated into the market - Normally sell to middlemen / commission agents. - Unlikely users of EWRs → May face high transaction costs (transport etc) - Rely mostly on Informal credit - Likely to continue to function within the traditional system. **What can be done for small farms? (Competition for Arhtis)**	- Market oriented. - Better market access than smaller farmers. - Have the capacity to modernize, but with credit limitations. - Formal + informal credit - Better situated to benefit from EWRs - Generate rural non-farm demand **Have the most potential to be drivers of rural transformation. What assistance can be provided in the short-run?**	- Produce for commercial markets. - Better market access. Historically better positioned to benefit from government procurement. - Capacity to be early adopters of technology and will determine success of modern marketing system - Capacity to diversify without much credit limitations - Capacity to develop adequate storage. - Spending habits similar to that of urban consumers (Mellor and Malik, 2017)
Traditional	**Transitional**	**Modern**

Mentimeter

Final Points..

- Short-term support to wheat deficit provinces/regions for storage and more expensive procurement
- Development of Wheat Market Information Systems to track stocks and storage? Will come along with formation of storage entities/futures markets
- Costs vs. Benefits of trading platforms → may require careful consideration. PMEX contracts?

In Summary...

- Wheat has been central to agriculture and ag policy, driving next season's kharif cultivation as well, with historically reliable returns.
- Changes in procurement and support prices have reduced farmers' overall earnings, impacting the wider agricultural sector and rural economy.
- Despite predictions of a sharp drop in acreage for 2024-25, wheat acreage surprisingly remained at 2022 levels.
- Small farmers individually supply little but collectively contribute over 50% of total marketed produce.
- Seasonal price gains exist, but storage returns depend on many other factors.
- EWRs could address financing gaps, though access (by farmer category) remains uncertain.
- The traditional system of village aggregators, aartis, and creditors remains vital; the challenge is whether to regulate it to complement modern systems
- Changes in wheat policy, production, and marketing are likely to drive broader rural transformation by reshaping farmer incomes, crop mix, and market structures.

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Thank You