



Trends and volatility in domestic and international prices of livestock products in India

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ABSTRACT

The economic reform triggered during 1990s has facilitated the integration between domestic and international markets. The integration between domestic and international markets has important implications on social welfare. This paper analyse the trends and volatility in the prices of livestock products and the extent of transmission of international prices to domestic markets. The international prices of dairy products have been more volatile than domestic prices. The prices and the level instability of meat products were similar in both the markets. The transmission of global prices would help in reducing the domestic prices of meat products except bovine meat. The prices of bovine meat would increase as a consequence of transmission of prices from international to domestic markets.

Key words: Livestock prices, Price volatility, Trends in livestock prices

The rising global demand for livestock products, various global trade negotiations and domestic reforms on different aspects of livestock sector, have improved the access of India to international markets substantially, particularly during the post-WTO period (Kumar *et al.* 2007, Kumar 2010). However, apprehensions are being raised about the capacity of the Indian livestock farmers, a majority of whom are small and marginal, in availing the advantage of emerging opportunities under the liberalized trade scenario. Further, the global prices of livestock products, particularly of dairy products have registered a tremendous increase. The trend in international prices is one of the most important factors in determining competitiveness, export, import and choice of tariffs by any country (Chand 2002). The world prices are perceived as the efficiency benchmark in determining the optimal use of domestic resources with greater integration in the global economy, the transmission of prices between domestic and international market is perceived to become easier. The transmission of prices has profound impact on the consumer and producer welfare. The impact on social welfare however depends on the elasticity of price transmission to a large extent. Therefore, analysis of trends in international prices and the extent of transmission of these prices to the domestic market assume considerable

significance in formulating an effective trade policy and domestic production policy for any country.

MATERIAL AND METHODS

The study is based on the data, compiled from various sources, for the period from 1980–81 to 2007–08. The domestic wholesale prices of livestock products were compiled from Agricultural Prices in India (Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, New Delhi) and the data on the international prices of livestock products prior to 1991 were taken from International Financial Statistics (International Monetary Fund (IMF)). The data on international prices since 1991 were downloaded from the FAO website.

The ratio method, which estimates standard deviation in the ratio, was used in this study. It is the unit free measure of instability and represents deviations from the trend growth line. The price instability was estimated by this method as per equation (1):

$$\text{Price instability index (I}_p\text{)} = \text{standard deviation of } \log (P_t/P_{t-1}) * 100 \dots\dots(1)$$

where, P is the price and t and t-1 denote the years.

The linkage between domestic and international markets can be described by the elasticity of price transmission. The price transmission elasticity is a measure of co-movement of prices and shows the extent to which changes in world prices are transmitted back to the country prices. The price transmission elasticity was estimated using equation (2):

$$\ln P_i^d = \beta_0 + \beta_1 \ln P_i^b + U_i \dots\dots (2)$$

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where, P_1^d , domestic price of livestock products; P_1^b , border (international) price of livestock products; U , error-term; β_0 , constant; and β_1 , is the price transmission elasticity defined as the percentage change in domestic price in response to one % change in the world price.

RESULTS AND DISCUSSIONS

Trends in domestic and international prices of livestock products: The prices of different livestock products, viz. whole milk powder (WMP), skimmed milk powder (SMP), butter, beef, pork, ovine meat and poultry meat in domestic and international markets in different years were analyzed to find the trends in each of these livestock products.

The international prices in dairy and meat products have exhibited large variations. While the prices of all dairy products have increased substantially during the past 28 years, the prices of meat and poultry, by and large, showed stagnation or a marginal increase. However, the prices of all livestock products in the post-2000 period swelled considerably, though with a varying magnitude. The price of whole milk powder was US \$1243/tonnes in TE 1981, which shot up to US \$2880/ tonnes in TE 2007, an increase of nearly 2.5-times. The price of SMP increased from US \$837/ tonnes in TE 1981 to US\$ 2911/ tonnes in TE 2007, registering a 3.5-fold increase in 28 years. Similarly, the price of butter increased substantially, from US\$ 1300/ tonnes in TE 1991 to US\$ 2287/ tonnes in TE 2007 (Table 1).

The trends in prices of whole and skimmed milk powders indicated that the international prices of milk also moved up along the rising trend, showing the annual growth rate of 3.1% in WMP and 4.6% in SMP. Further, the annual growth in WMP prices was only 1.2% during the 1980s and 1990s; the annual growth in SMP prices was 5.01% during 1980s and 1.4% during 1990s. But, in the post-2000 period, both these products registered a tremendous annual growth of 13%. Similar seems to be the case for butter. In 1990s, price of butter showed a stagnation or slight decline but in the post- 2000 period, it registered a whopping annual growth rate of 15%. The upward and downward movements in the

international prices may be attributed to the cyclical world economic growth and movements in the production of these commodities, since dairy products are believed to be income elastic. For instance, the rising trends in prices of milk powders after 2001 may be attributed to their increased demand from the importing countries like China and South east Asia due to their high economic growth. Further, the swelling income realized from the whooping oil prices fostered a strong import demand in the Middle east and North African countries for the dairy products (Elumalai and Sharma 2008).

The domestic prices of dairy products in India displayed a behaviour similar to the one witnessed in the international markets (Table 2). However, variation was narrow in domestic prices. The domestic prices of milk hovered around US\$ 390–400/tonnes during 1980s, but declined considerably during 1990s, touching US\$325/ tonnes in TE 2001. The domestic milk prices registered a modest increase of 5% per annum during the period 2001 to 2007. The domestic price of butter registered an annual growth rate of 2.9% during the 1980s and increased from US \$2743/ tonnes in TE 1981 to 3397/ tonnes in TE 1991.

The domestic price of butter depicted a variable trend; it started declining from 1991 and continued till 1994 and then increased till 1997 but declined again thereafter till 2000. After 2000, the butter price again showed an increasing trend, which continued till 2007. The annual growth in domestic butter price during post- 2000 period was registered as 6.2%.

The international price of beef was US\$ 2702/ tonnes in TE 1981 and remained almost stagnant during 1980s with a decline of 0.2% per annum, but during the 1990s, it declined considerably, @ 4.6% per annum. The trends suggested that price of beef started firming up from 1998 and increased continuously thereafter. The annual growth in the price of beef during the post-2000 period was 4.1% per annum.

The international price of pork increased at the annual growth rate of 2% during the 1980s, but declined significantly during the 1990s at an annual rate of 4.6%. During the post-2000 period, the prices started firming up, but stability was

Table 1. International prices of livestock products and their annual growth rates (1980–2007)

(\$US/tonne)							
Period	WMP (NZ)	SMP (NZ)	Butter (NZ)	Beef (USA)	Pork (USA)	Ovine Meat (NZ)	Chicken (USA)
TE 1981	1243	837		2702	3456		600
TE 1991	1523	1374	1300	2592	3569	4060	823
TE 2001	1767	1744	1276	1964	2065	3013	614
TE 2007	2880	2911	2287	2592	2088	4209	839
CAGR							
1980–90	1.2	5.1		–0.2	2.0		2.4
1991–00	1.2	1.4	–1.0	–4.6	–5.2	–4.8	–5.1
2001–07	12.9	12.9	15.2	4.1	1.4	8.4	7.0
1980–07	3.1	4.6	1.5	–0.4	–2.4	–0.4	0.5

Table 2. Domestic prices of livestock products in India (1980–2007)

(US \$/tonne)

Period	Wholesale prices in India					
	Milk	Butter	Mutton	Beef	Pork	Eggs+ Poultry
TE 1981	396	2743	1776	545	779	49
TE 1991	390	3397	1641	598	680	41
TE 2001	325	2794	2459	830	874	22
TE 2007	411	3631	3413	996	1326	41
CAGR (%)						
1980–90	0.9	2.9	–0.2	2.4	0.6	–0.3
1991–00	–1.2	0.3	6.8	4.7	3.4	–3.8
2001–07	5.4	6.2	7.0	3.0	7.9	14.0
1980–07	–0.8	0.1	2.6	2.9	2.1	–2.0

not as vivid as in beef. The price of ovine meat was US\$ 4060/ tonnes in TE 1991, which declined @ 4.8% per annum and dropped to US\$ 3013/ tonnes in TE 2001. The declining trend continued till 2002, but from 2003 an upward trend started which continued till 2007. The prices of poultry meat depicted a mixed trend over the study period. Its price which was around US\$ 600/ tonnes in early 1980s, went above US\$700/ tonnes by late 1980s and further to US \$980/ tonnes in 1991. It remained above US\$ 900/ tonnes till 1996, except in 1993. After 1996, the price of poultry meat started declining which continued till 2002, and thereafter it again increased to US \$935/ tonnes in 2007.

Table 3. Instability in international and domestic prices of livestock products (1980–2007)

(US \$/tonne)

Commodity	1980s	1990s	2000–07	1979–07
Milk				
International Price				
WMP	23.3	18.1	28.2	23.1
SMP	28.2	22.5	30.1	27.0
Domestic Price	5.5	7.7	27.0	14.4
Butter				
International Price		13.2	25.1	20.0
Domestic Price	7.1	11.4	7.0	9.0
Mutton				
International Price		9.8	9.5	10.2
Domestic Price	7.1	9.4	13.0	9.4
Beef				
International Price	7.0	8.9	6.9	8.1
Domestic Price	13.7	29.4	19.1	21.3
Pig Meat				
International Price		9.5	8.0	13.4
Domestic Price	14.6	10.5	8.2	11.6
Poultry Meat				
International Price	12.0	16.0	13.9	14.0
Domestic Price		12.0	5.5	9.5
Egg				
International Price				
Domestic Price	6.8	16.3	13.2	13.8

The domestic prices of mutton as well as beef remained almost stagnated during the 1980s. During post-2000 period, the price of mutton registered an annual growth rate of 7%, and of beef depicted an annual growth of 4.7% during 1991–2000 and of 3.0% during 2001–07. The domestic price of pork increased consistently and in TE 2007, it was almost double of that in TE 1981. The price of eggs declined from US\$49/1000 in TE 1981 to US\$ 41/1000 in TE 2007. The domestic prices of eggs declined during the 1980s and 1990s, but increased at the annual rate of 14% during 2001–07. The domestic price of poultry increased moderately during the 1990s, but during 2001–07 showed an annual growth rate of 2.5%.

Volatility in the domestic and international prices of livestock products: A comparative picture of instability in the international and domestic prices of livestock products is presented in Table 3. The inter-year variations in annual prices of livestock commodities were higher in international than domestic prices in dairy products and instability trends for meat and poultry were similar for international as well as domestic prices. The international prices were more volatile for dairy products than meat and poultry products. Further, variability was higher during the 1980s than 1990s. The

Table 4. Elasticity of international and domestic price transmission

Explanatory Variables	Coefficient	Constant	R ₂
Bovine meat (USA, beef export, export unit value)	1.08** (4.30)	–2.80 (–1.37)	0.59
Ovine meat (New Zealand, lamb, frozen whole carcasses, wholesale price, Smithfield (London))	0.45** (3.25)	3.89** (3.48)	0.45
Poultry meat (USA, Broiler cuts, export unit value)	(1.04)	(38.54)	0.08
Pig meat (USA, pork, frozen product, export unit value)	0.61** (5.34)	1.33 (1.49)	0.69

Figures in parentheses are 't' values; **significant at 1% level; significant at 5% level.

Table 5. Impact of international price transmission on domestic prices

(\$US/tonne)

Impact of wholesale prices on	Bovine meat	Goat meat	Sheep meat	Poultry meat	Pig meat
1. Domestic price	1051	3451	3451	1744	1296
2. Handling/marketing charges	61	61	61	61	61
3. Transportation cost to port	130	130	130	130	130
4. Reference price (1+2+3)	1242	3642	3642	1935	1487
5. F.O.B. price at port	2555	4439	4439	734	2161
6. NPC (4/5)	0	1	1	3	1
7. Domestic price under free trade (5–2–3)	2364	4248	4248	543	1970
8. Change in domestic price under free 100 trade (7–1)/1)*	125	23	23	–69	52
9. Farm level price	360	2310	2674	1597	458
10. Farm level price under free trade (9+9*(8/100)ET	875	1280	856	10	425
11. Change over farm price % (10–9)/9)*100	143	–45	–68	–99	–7

international price variability in all the dairy products increased during the post-2000 period. It seems that instability and growth in international prices are positively related and move concurrently. The period which witnessed higher growth in prices, experienced higher instability too. Several studies showed that international prices of agricultural and livestock commodities depict more volatility than shown by the domestic prices (Nayyar and Sen 1994, Chand 2002).

It has also been argued that lower volatility in the domestic prices as compared to that in international prices is not because of less instability in domestic demand and supply factors but it is because of government intervention in the domestic market to maintain price stability. Therefore, apprehensions were raised during the early phase of liberalization that free trade would trigger a high instability in the domestic prices, which would be detrimental to small and marginal farmers and poor consumers. However, the empirical evidence has not supported this contention. The international prices of butter have shown more volatility than by the domestic prices. But, in meat products, a mixed pattern was observed. The domestic prices of beef were more volatile than the international prices, while the reverse was observed for poultry. The beef and mutton witnessed almost the same level of volatility in the domestic as well as international markets.

Transmission of international prices to domestic markets:

The estimates of price linkage equations indicated that 1% increase in bovine meat price in the international market results in 1.09% change in its domestic price in India. The elasticity of transmission was found 0.45% for ovine meat and 0.61 for pork, while in poultry meat it was not significant (Table 4).

The impact of price transmission on consumer and producer prices, recorded in Table 5, depicts a mixed picture under free trade scenario. In goat, sheep, pork and poultry, the consumers would have gained and producers would have

been the losers. But, in beef and pork, the producers would have been the beneficiaries due to increase in the producer prices by 54% in beef and 29% in pork. However, the expected price transmission depends largely on the extent of competition and level of infrastructural development in the domestic market. Sometimes restrictions on internal movements preclude the producers from reaping the benefits.

The price behaviour in the international markets does not seem to have a significant effect on the domestic prices of livestock products. In general the international prices of dairy products have been more volatile than their domestic prices and in case of meat products, the level of instability has been similar in both the domestic and international markets. The international and domestic prices have both followed downward and upward trends intermittently. In general, the prices of livestock products were suppressed during the 1990s and started firming up particularly after 2000. During the past 2 years, the dairy prices have witnessed a tremendous increase. The analysis of transmission of prices revealed that the impact of changes in global prices of livestock commodities would be different for varied commodities. The farm level prices would be positively affected by increase in international prices of bovine meat. The impact of integration with global markets would be negative for sheep, goat, poultry and pig meat.

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