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Evaluating Crop Forecast Accuracy for Corn and Soybeans in the United States, China, Brazil, and Argentina

by

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INTRODUCTION

Commodity prices are determined by the dynamics of supply and demand and they oscillate over time according to market participants' price expectations, which are in return formed and updated based on new information available on the market. Previous studies have explored how the release of supply and demand news affect futures prices (e.g. McKenzie, 2008). This process of price discovery is crucial for various business decisions in the agricultural sector, such as production, marketing, and risk management.

Public-available crop reports are one of the main sources of information about underlying supply and demand in various agricultural markets. Government agencies such as the USDA collect and analyze data on crop supply and demand, and then distribute their results and forecasts to all market participants. Due to the leadership position of U.S. agriculture in the world and the comprehensiveness and the timeliness of USDA reports, crop reports from USDA have historically been considered the benchmark for all supply and demand information available to the market worldwide (Lusk, 2013).

However, changes in global crop productions over the past decade have raised concerns regarding the accuracy of USDA crop reports. The share of US major grain exports in the global market declined steadily over the past several years, while Brazil and Argentina have quickly emerged as top players in the world market. In light of the growing importance of crop production outside of the US, it is uncertain whether USDA crop reports remain as the most accurate source of information on global supply-and-demand conditions, and whether they still serve as a benchmark for the global market. Additionally, as USDA resources are being reduced, agencies downsized, and programs scrutinized (Hoffman et al. 2016), there might be less resources to fund the preparation of USDA crop reports, raising further questions regarding the quality of their data collection and forecasts. Evaluating the reliability and accuracy of crop reports in light of these new developments appear to be an important issue as these reports are widely used by market participants to assess market conditions and predict prices. Their assessments and predictions are only as accurate as the information that they are using.

The objective of this research is to build on previous literature and evaluate the accuracy of crop reports in three steps. First, we will investigate forecast accuracy over time of all balance sheet categories for corn and soybeans in Argentina, Brazil, China, and United States based on World Agricultural Supply and Demand Estimates (WASDE) reports prepared by the USDA. In addition to these four countries, will also explore the "World", i.e. all countries which produce and/or consume corn and soybeans. WASDE reports release regular forecasts on balance sheets categories for a given crop year during the months leading to the beginning of the crop year and then during the crop year.

The second step will conduct the same analysis for crop reports prepared by agencies in other countries. Crop reports from Brazil (from the Brazilian Food Supply Company–CONAB) and Argentina (from the Ministry of Agriculture) will be used for this analysis. The third step will focus on specific balance sheet categories, exploring the forecast accuracy of different reports for the same category. For example, both USDA and CONAB forecast Brazilian production of corn and soybeans, but which agency does a better job at forecasting Brazilian grain production? Should market participants interested in forecasts for Brazilian production focus on reports from one single agency, or do reports from both agencies offer useful information? The second and third steps are still in progress and are not presented in this manuscript.

Results from this research will provide interesting insights into the evolution of forecast accuracy in recent years, adding more information to findings from previous research. More importantly, our results will offer new insights on forecast accuracy from crop reports prepared by different agencies in three of the major grain producing countries in the world. These results will shed new light to the usefulness of publicly available information in grain markets and help us better understand the impact of different crop reports on grain prices.

DATA

Balance sheet estimates for corn and soybeans released in the WASDE reports are the main data for this research. Estimates for the following balance sheet items will be explored for each country: production (corn and soybeans), imports (corn and soybeans), domestic use (corn and soybeans), exports (corn and soybeans), ending stocks (corn and soybeans), feed (corn only), and crushings (soybeans only).

The balance sheet items explored in this research correspond to the main components of supply and demand for which there is data readily available for all countries. As shown in Figure 1, production and imports are the main supply items in the balance sheet. Beginning stocks are also a component of total supply, but this item is the same as the ending stocks in the previous crop year. For the purpose of this research, it would be redundant to also include beginning stocks, since ending stocks are also investigated here. Domestic supply accounts for all the grain used domestically in each country, with feed (corn) and crushings (soybeans) representing the main components that are common to all countries (other components of domestic use are also relevant, but data are not readily available across all countries). Exports are also investigated, which yields the value for total use as it is added to domestic use (total use is not analyzed by itself in this research). Finally, ending stocks are calculated by subtracting total use from total supply.

Figure 1: Balance sheet items for corn and soybeans in the WASDE report

Corn	Soybeans
Beginning stocks (1)	Beginning stocks (1)
Production (2)	Production (2)
Imports (3)	Imports (3)
Total supply (1+2+3)	Total supply (1+2+3)
Feed and residual (4)	Crushings (4)
Food, seed and industrial use (5)	Seed (5)
	Residual (6)
Domestic use (4+5)	Domestic use (4+5+6)
Exports (6)	Exports (7)
Total use (4+5+6)	Total use (4+5+6+7)
Ending stocks (total supply – total use)	Ending stocks (total supply – total use)

WASDE reports are released monthly with estimates for all balance sheet items for the current and next crop years. The first estimate for a given crop year is released in the month of May preceding the beginning of the crop year, while the last estimate for the same crop year is released a few months after its end. Therefore, there are approximately 20 monthly estimates for each balance sheet item for a given crop year. The sample generally starts in the early 1980's, but the total sample size for each country varies from 14 to 36 years (Table 1). For example, the corn sample for Brazil starts in 2002/03

because corn was not a relevant crop in Brazil before that time. Hence, WASDE would not report individual estimates for corn in Brazil before 2002.

Table 1: WASDE sample periods for each country

	Corn	Soybeans
Argentina	1985/86 – 2015/16 (31 years)	1985/86 – 2015/16 (31 years)
Brazil	2002/03 – 2015/16 (14 years)	1985/86 – 2015/16 (31 years)
China	1988/89 – 2015/16 (28 years)	1997/98 – 2015/16 (19 years)
United States	1985/86 – 2015/16 (31 years)	1980/81 – 2015/16 (36 years)
World	1985/86 – 2015/16 (31 years)	1981/82 – 2015/16 (35 years)

RESEARCH METHOD

Monthly estimates from WASDE reports will be used to discuss forecasting accuracy for balance sheet items, i.e. it will be explored how accurate each monthly estimate is compared to the final estimate. At this stage, percentage forecast error (FE) is used as a measure of forecasting accuracy, and it is calculated for each month in the WASDE report.

Forecast error is calculated for each balance sheet item as shown in equation 1, where FE_{kt} is the percentage forecast error for month k in year t, y_{kt} is the estimate for month k in year t, and y_t is the final estimate for year t. Positive (negative) values for FE indicate that monthly released are overestimating (underestimating) the final value for a given balance sheet item.

$$FE_{kt} = \frac{y_{kt} - y_t}{y_t} \tag{1}$$

Following previous literature in the field (Bailey and Brorsen, 1998; Sanders and Manfredo, 2002; Egelkraut et al., 2003; Botto et al., 2006), regression analysis is used to investigate the presence of trends in the mean and variance of the forecast errors. Equation 2 is used to explore trends in the mean of forecast errors as they are regressed against month ($k=1,\ldots$), year ($t=1,\ldots$) and an interaction term. If monthly WASDE estimates are unbiased, all coefficients in (2) should be equal to zero, suggesting that there is no consistent bias across months of the crop year or across crop years. On the other hand, if the coefficients in (2) are either positive or negative, this would indicate that balance

sheet items are consistently overestimated or underestimated across months of the crop year or across crop years.

$$FE_{kt} = \beta_0 + \beta_1 k + \beta_2 t + \beta_3 kt + \varepsilon_{kt}$$
$$\varepsilon_{kt} \sim N\left(0, \sigma_{kt}^2\right) \quad (2)$$

Similarly, equation 3 is used to explore trends in the variance of forecast errors as they are also regressed against month (*k=1,…*), year (*t=1,…*) and an interaction term. If monthly WASDE estimates become more accurate over time (i.e. less variability in the forecast errors), then coefficients in (3) should be negative, suggesting that the variance becomes smaller across months of the crop year and across crop years.

$$\sigma_{kt}^2 = \gamma_0 + \gamma_1 k + \gamma_2 t + \gamma_3 kt + \upsilon_{kt} \quad (3)$$

RESULTS

Initial analysis of forecast errors is done using boxplots across months of the crop year. As can be seen in Figure 2 and Figure 3 (Appendix), two general insights are gathered from the boxplots. There seems to be more variability in forecast errors in the early months and less variability in the later months, towards the final estimate. This suggests that estimates become more accurate towards the final reports of the crop year. In addition, there appears to be evidence of bias in some variables for Argentina, Brazil and China, especially in the early months.

Further, mean forecast errors are calculated for each variable in each month across years, and the null hypothesis that these means are equal to zero are tested using t-tests. Results indicate that mean forecast errors for some variables are statistically distinguishable from zero in several months, suggesting some degree of overestimation or underestimation. For example, mean forecast errors for corn production were found to be statistically distinguishable from zero in months 11 through 21 for Argentina, months 15 and 16 for Brazil, months 2 through 15 for China, months 10 through 12 for the United States, and months 4 through 22 for the World (Table 2). As another example, mean forecast errors for soybean ending stocks were also found to be statistically distinguishable from zero in months 1 through 8, 11, 13 and 19 in Argentina, months 18 through 21 for Brazil, months 12 and

13 for China, months 15 through 21 for the United States, and months 15 through 21 for the World as well.

Table 2: Months in which null hypothesis can be rejected (H_0: mean FE = 0) [(a)]

	Argentina	Brazil	China	United States	World
			Corn		
production	11-21	15, 16	2-15	10-12	4-22
dom. use	-	-	-	12-16	5, 7, 8, 10, 11, 15, 21, 22
feed	-	-	-	9-22	-
exports	18-20	-	1-11	-	3-22
imports	-	-	1-7, 11-13	-	1-19
end. stocks	1-4	21	1-12	15, 16	3-18
			Soybeans		
production	-	10-21	-	11-21	11-21
dom. use	-	14-20	1-4, 15, 16	3, 4, 14, 15, 19, 20	3, 4, 14, 15, 19, 20
crushing	-	14-18	1-4, 15, 16	13-20	13-20
exports	9, 10	-	-	13, 14	13, 14
imports	-	1-8	11-16	1-3, 12-15	1-3, 12-15
end. stocks	1-8, 11, 13, 19	18-21	12, 13	15-21	15-21

(a) Month 1 is the first month when estimates are released from a given crop year, month 2 is the second month when estimates are released from a given crop year, and so on.

Finally, equations (2) and (3) were estimated to explore the existence of trends in the mean and variance of forecast errors for each variable. Regression results for corn are presented in Table 3 through Table 7, and for soybeans in Table 8 through Table 12. Starting with corn forecasts, there is evidence of bias for all countries, except the United States. Looking at the mean equation, production and exports are overestimated for Argentina (Table 3), while ending stocks are underestimated for Brazil (Table 4) and World (Table 7). For China, almost all variables are underestimated (Table 5). Still, in all those cases, there is also evidence that estimates improve within the year and across years, as can be seen from the statistically significant coefficients for the month, year and interaction term for those countries. On the other hand, no coefficient in the mean equation is statistically distinguishable from zero for the United States (Table 6). Regarding the variance equation, estimated coefficients are mostly negative and statistically distinguishable from zero, indicating that the variability of forecast errors becomes smaller within years and across years.

Table 3: Regression results for corn in Argentina [(a)]

	Mean equation				Variance equation			
	Intercept	Month	Year	Interaction	Intercept	Month	Year	Interaction
Production	0.1921*	-0.0098*	-0.0105**	0.0005	-2.1404***	-0.2977***	-0.0832**	0.0058**
Dom. use	0.0080	-0.0000	0.0003	-0.0001	-1.1700*	-0.2608***	-0.1359***	0.0042*
Feed	0.1466	-0.0046	-0.0049	0.0001	-0.6525	-0.1978***	-0.1468***	0.0029
Exports	0.4764***	-0.0244**	-0.0261***	0.0012***	-0.9540	-0.1976***	-0.0926***	0.0015
Imports [(b)]	-	-	-	-	-	-	-	-
End. stocks	-0.1219	0.0133	0.0322***	-0.0011	-2.1958***	0.0233	0.0556**	-0.0026

(a) ***, ** and * indicate statistically distinguishable from zero at 1%, 5% and 10%, respectively; (b) This variable is not considered here because it is not economically relevant for this country, i.e. their values are relatively small. Changes in small values often generate very large forecast errors that may be statistically significant but are not economically significant.

Table 4: Regression results for corn in Brazil [(a)]

	Mean equation				Variance equation			
	Intercept	Month	Year	Interaction	Intercept	Month	Year	Interaction
Production	-0.0769	0.0033	-0.0000	0.0000	-2.8863***	-0.3743***	-0.0053	0.0019
Dom. Use	-0.0089	0.0003	0.0018	-0.0000	-5.4296***	-0.3208***	-0.1064	0.0048
Feed	0.0258	-0.0009	-0.0011	0.0000	-5.1249***	-0.1188*	-0.1466	-0.0093
Exports	0.8797	-0.0504	-0.0901	0.0050	2.3116**	-0.3154***	-0.3312**	0.0092
Imports [(b)]	-	-	-	-	-	-	-	-
End. stocks	-0.9342***	0.0437***	0.1091***	-0.0047***	-4.4509***	0.0141	0.2217**	-0.0088

(a) ***, ** and * indicate statistically distinguishable from zero at 1%, 5% and 10%, respectively; (b) This variable is not considered here because it is not economically relevant for this country, i.e. their values are relatively small. Changes in small values often generate very large forecast errors that may be statistically significant but are not economically significant.

Table 5: Regression results for corn in China [(a)]

	Mean equation				Variance equation			
	Intercept	Month	Year	Interaction	Intercept	Month	Year	Interaction
Production	-0.0607***	0.0029**	0.0012	-0.0001	-4.4111***	-0.3085***	-0.0676	0.0001
Dom. use	-0.0247**	0.0013**	0.0012	-0.0001	-7.3123***	-0.2433***	0.0069	0.0020
Feed	-0.0275**	0.0016**	0.0019	-0.0001	-8.3375***	-0.1633***	0.1038*	-0.0052
Exports	-0.6376	0.0181	0.1420**	-0.0060*	-0.9741	-0.1921***	0.1471***	-0.0042
Imports	6.1257***	-0.3357**	-0.1900**	0.0109**	4.1203***	-0.2346***	-0.1532***	0.0014
End. stocks	-0.1945***	0.0099***	0.0003	-0.0000	-2.9857***	-0.2564***	-0.0322	0.0021

(a) ***, ** and * indicate statistically distinguishable from zero at 1%, 5% and 10%, respectively.

Table 6: Regression results for corn in the United States [(a)]

	Mean equation				Variance equation			
	Intercept	Month	Year	Interaction	Intercept	Month	Year	Interaction
Production	0.0068	-0.0005	0.0004	-0.0000	-6.3954***	-0.3653***	-0.0505	0.0048**
Dom. use	-0.0066	0.0004	0.0006	-0.0000	-4.8575***	-0.3618***	-0.1042***	0.0060***
Feed	-0.0101	0.0006	0.0016	-0.0001	-4.4334***	-0.3541***	-0.0781	0.0066**
Exports	-0.0025	0.0002	0.0033	-0.0002	-2.0470***	-0.4843***	-0.0866**	0.0105***
Imports	-0.0622	0.0058	-0.0067	0.0002	-0.1725	-0.2387***	-0.0647*	-0.0024
End. stocks	0.0972	-0.0059	-0.0029	0.0001	-2.7734***	-0.2665***	-0.0194	0.0040

(a) ***, ** and * indicate statistically distinguishable from zero at 1%, 5% and 10%, respectively.

Table 7: Regression results for corn in World [(a)]

	Mean equation				Variance equation			
	Intercept	Month	Year	Interaction	Intercept	Month	Year	Interaction
Production	-0.0065	0.0001	-0.0005	0.0000	-7.0538***	-0.2749***	-0.0299	0.0005
Dom. use	-0.0027	-0.0001	-0.0002	0.0000	-7.1556***	-0.2443***	-0.0491	0.0013
Feed	-0.0066	0.0002	0.0002	-0.0000	-6.9703***	-0.2359***	-0.0497	0.0022
Exports	0.0126	-0.0006	-0.0046***	0.0002*	-4.9720***	-0.2705***	0.0077	0.0032*
Imports	0.0076	-0.0001	-0.0040***	0.0002**	-4.7951***	-0.2374***	-0.0649*	0.0024
End. stocks	-0.1102**	0.0048	-0.0010	0.0001	-2.8852***	-0.3174***	-0.0852**	0.0046**

(a) ***, ** and * indicate statistically distinguishable from zero at 1%, 5% and 10%, respectively.

Now turning to soybeans, there is evidence of bias for Argentina, China and United States, but not for Brazil and World. Focusing on the mean equation, exports are overestimated and ending stocks are underestimated for Argentina (Table 8), domestic use, crushings and exports are underestimated for China (Table 10), and production and imports are overestimated for the United States (Table 11). Again, in all those cases, there is also evidence that estimates improve within the year and across years, as can be seen from the statistically significant coefficients for the month, year and interaction term for those countries. On the other hand, no coefficient in the mean equation is statistically distinguishable from zero for Brazil (Table 9) and World (Table 12). Regarding the variance equation, similar to what was discussed before, estimated coefficients are generally negative and statistically distinguishable from zero, indicating that the variability of forecast errors becomes smaller within years and across years.

Table 8: Regression results for soybeans in Argentina [(a)]

	Mean equation				Variance equation			
	Intercept	Month	Year	Interaction	Intercept	Month	Year	Interaction
Production	0.0001	-0.0005	0.0001	0.0000	-4.6736***	-0.1927***	0.0045	-0.0056
Dom. use	-0.0539	0.0030	0.0027	-0.0001	-3.2755***	-0.3281***	-0.0515	-0.0009
Crush	-0.0545	0.0031	0.0030	-0.0002	-3.4291***	-0.3300***	-0.0335	-0.0017
Exports	1.0868*	-0.0583*	-0.0363	0.0019	1.2305*	-0.3474***	-0.0916***	0.0018
Imports [(b)]	-	-	-	-	-	-	-	-
End. stocks	-0.2163***	0.0085**	0.0070**	-0.0002	-3.5359***	-0.1098**	-0.0037	-0.0051**

(a) ***, ** and * indicate statistically distinguishable from zero at 1%, 5% and 10%, respectively; (b) This variable is not considered here because it is not economically relevant for this country, i.e. their values are relatively small. Changes in small values often generate very large forecast errors that may be statistically significant but are not economically significant.

Table 9: Regression results for soybeans in Brazil [(a)]

	Mean equation				Variance equation			
	Intercept	Month	Year	Interaction	Intercept	Month	Year	Interaction
Production	-0.0355	0.0008	0.0011	0.0000	-5.2756***	-0.2351***	-0.0016	-0.0014
Dom. use	-0.0181	0.0006	0.0002	0.0000	-3.8312***	0.3238***	-0.0754*	0.0024
Crush	-0.0112	0.0002	-0.0002	0.0000	-4.1941***	-0.2793***	-0.0398	-0.0013
Exports	0.0724	-0.0059	-0.0047	0.0003	-0.6923	-0.3407***	-0.1370***	0.0019
Imports [(b)]	-	-	-	-	-	-	-	-
End. stocks	-0.1248	0.0051	0.0081	-0.0004	-2.3252**	-0.2052***	-0.0165	-0.0015

(a) ***, ** and * indicate statistically distinguishable from zero at 1%, 5% and 10%, respectively; (b) This variable is not considered here because it is not economically relevant for this country, i.e. their values are relatively small. Changes in small values often generate very large forecast errors that may be statistically significant but are not economically significant.

Table 10: Regression results for soybeans in China [(a)]

	Mean equation				Variance equation			
	Intercept	Month	Year	Interaction	Intercept	Month	Year	Interaction
Production	-0.0332	0.0018	0.0024	-0.0001	-4.9284***	-0.3825***	-0.0511	0.0065
Dom. use	-0.1112***	0.0056***	0.0066***	-0.0003**	-4.3450***	-0.2761***	-0.0916	-0.0055
Crush	-0.1554***	0.0079***	0.0099***	-0.0005***	-3.7680***	-0.2802***	-0.1453	-0.0002
Exports	-0.5232***	0.0270***	0.0724***	-0.0038***	-1.5031*	-0.3481***	0.0618	0.0015
Imports	-0.0967	0.0043	0.0029	-0.0001	-1.2123	-0.3324***	-0.2453**	-0.0000
End. stocks	0.1776	-0.0099	-0.0225	0.0012	3.4083***	-0.5894***	-0.4198***	0.0191***

(a) ***, ** and * indicate statistically distinguishable from zero at 1%, 5% and 10%, respectively.

Table 11: Regression results for soybeans in the United States [(a)]

	Mean equation				Variance equation			
	Intercept	Month	Year	Interaction	Intercept	Month	Year	Interaction
Production	0.0285*	-0.0016	-0.0014**	0.0001*	-6.5138***	-0.2214***	0.0092	-0.0044**
Dom. use	-0.0051	0.0003	-0.0005	0.0000	-4.2910***	-0.4417***	-0.0385	0.0028
Crush	0.0065	-0.0004	-0.0013*	0.0001*	-5.4974***	-0.3390***	-0.0307	0.0012
Exports	0.0735	-0.0037	-0.0052***	0.0003**	-1.7452**	-0.4829***	-0.0852**	0.0050**
Imports	0.8038**	-0.0339*	-0.0302**	0.0013*	0.6840	-0.1969***	-0.0852	-0.0019
End. stocks	-0.0928	0.0030	0.0240***	-0.0011***	-2.5554***	-0.2366***	0.0534**	-0.0008

(a) ***, ** and * indicate statistically distinguishable from zero at 1%, 5% and 10%, respectively.

Table 12: Regression results for soybeans in World [(a)]

	Mean equation				Variance equation			
	Intercept	Month	Year	Interaction	Intercept	Month	Year	Interaction
Production	-0.0114	0.0003	0.0003	-0.0000	-6.6216***	-0.2315***	0.0157	-0.0047**
Dom. use	-0.0160	0.0008	0.0002	-0.0000	-5.6045***	-0.3423***	-0.0432	0.0007
Crush	-0.0124	0.0004	0.0001	0.0000	-5.7214***	-0.2893***	-0.0458	-0.0007
Exports	0.0052	-0.0004	-0.0015	0.0001	-4.4470***	-0.3369***	-0.0291	0.0008
Imports	0.0076	0.0002	-0.0012	0.0001	-5.4218***	-0.2177***	0.0142	-0.0047**
End. stocks	-0.0056	-0.0011	0.0004	0.0000	-3.7483***	-0.2137***	0.0074	-0.0026

(a) ***, ** and * indicate statistically distinguishable from zero at 1%, 5% and 10%, respectively.

CONCLUSION

Initial results of this research suggest that there is bias in the WASDE estimates for balance sheet variables for Argentina, Brazil, China, United States and World. There is evidence of both overestimation and underestimation depending on the variable and country in question. Overall, estimates for the United States appear to be less biased than for other countries. On the other hand, the degree of bias seems to be generally larger for Argentina and China.

Not surprisingly, our findings indicate that estimates tend to become more accurate as they approach the final months of the crop year. As more information becomes available during the crop year, it is possible to make more precise estimates and hence the bias tends to diminish. Similarly, regression results also suggest that estimates have become more accurate over time. Over the years, the magnitude of bias has become relatively smaller.

The next steps of this research will expand this analysis to include estimates for the same variables made by agencies in other countries (Argentina, Brazil, and China). This analysis will provide insights on the forecast accuracy of other agencies around the world. In addition, it will allow for comparisons of how different agencies perform as they make estimates on the same balance sheet variables.

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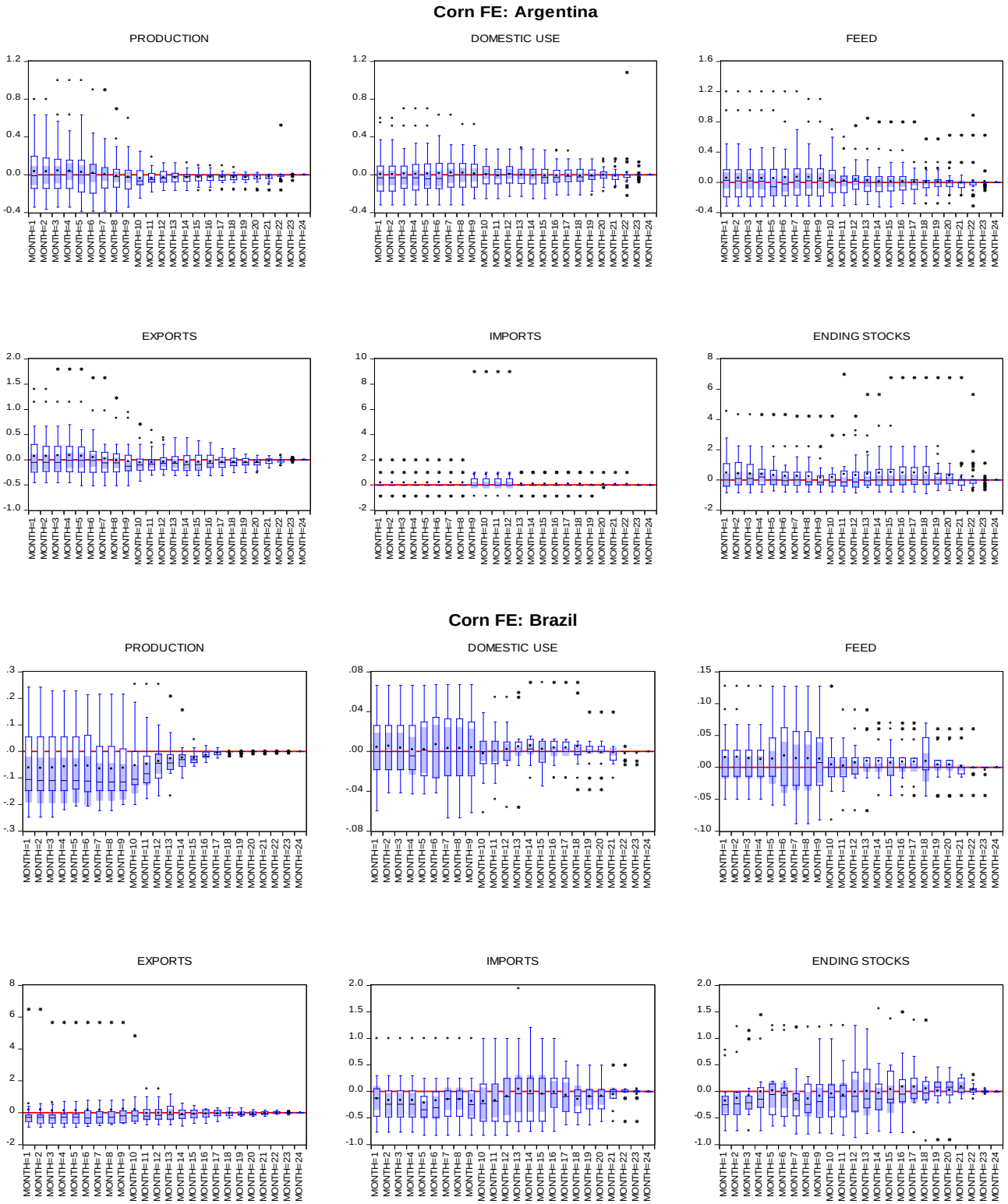
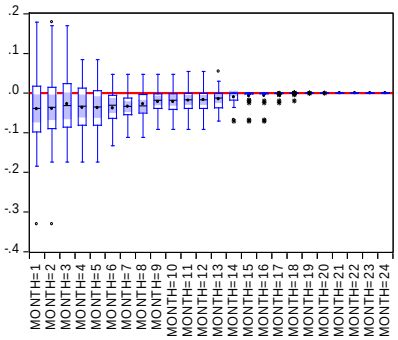
APPENDIX

Figure 2: Boxplots of forecast errors (FE) for corn across months in each country

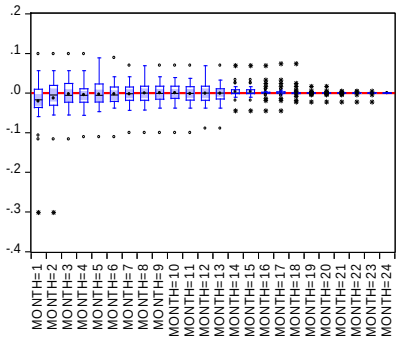


Corn FE: China

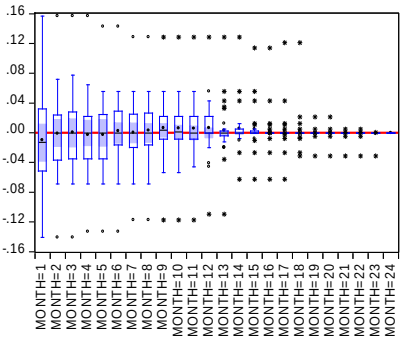
PRODUCTION



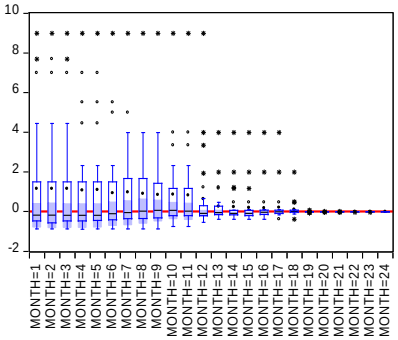
DOMESTIC USE



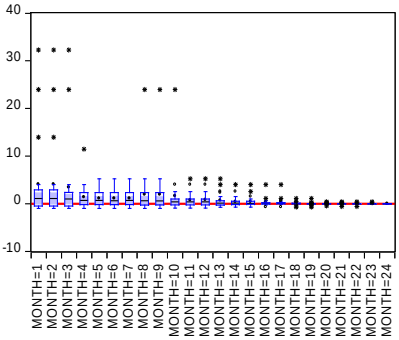
FEED



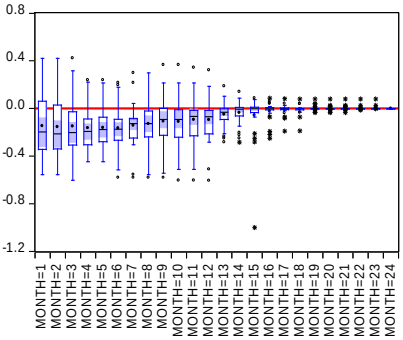
EXPORTS



IMPORTS

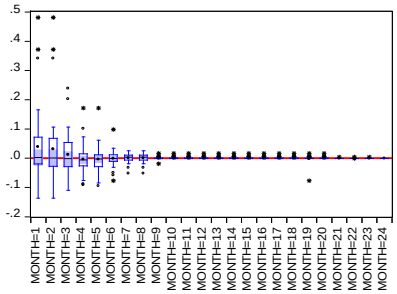


ENDING STOCKS



Corn FE: USA

PRODUCTION



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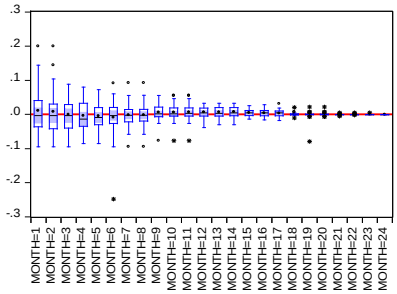
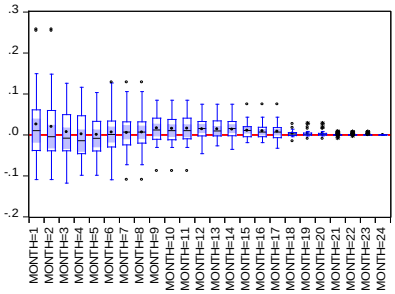


FEED



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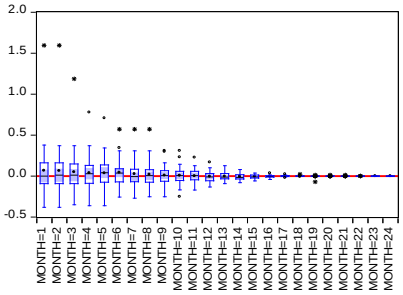

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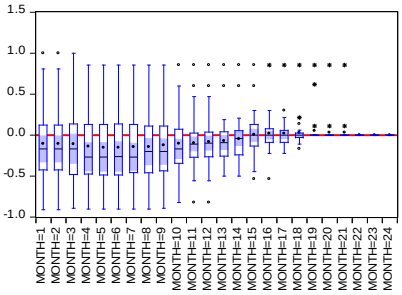


ENDING STOCKS

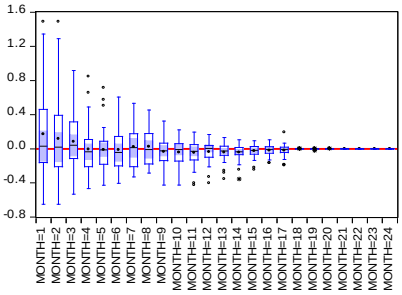
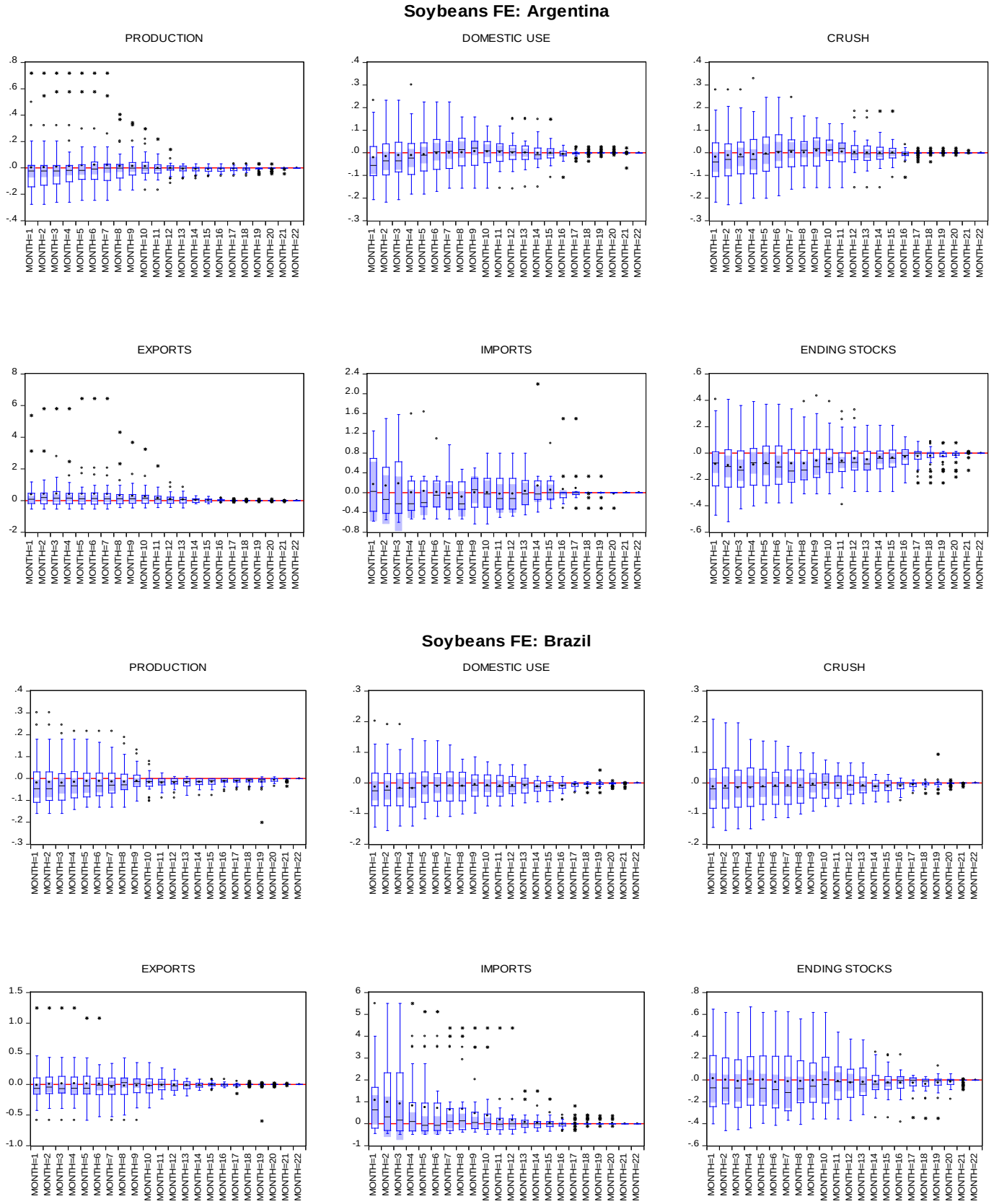
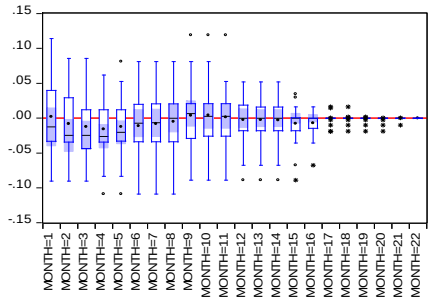


Figure 3: Boxplots of forecast errors (FE) for soybeans across months in each country

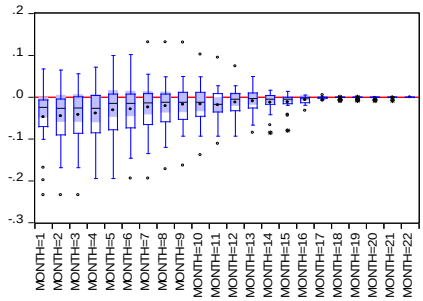


Soybeans FE: China

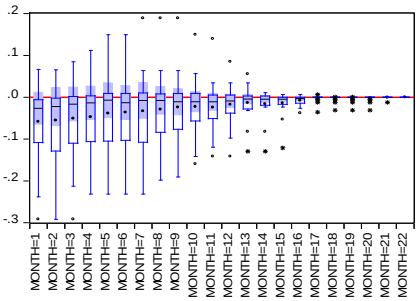
PRODUCTION



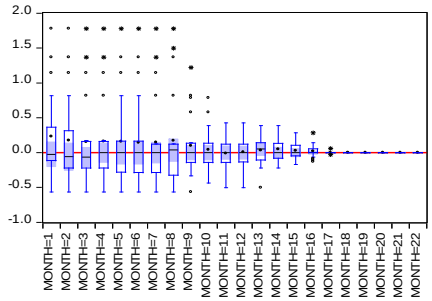
DOMESTIC USE



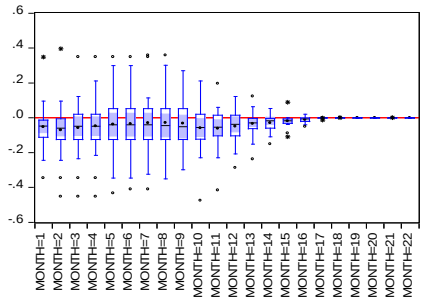
CRUSH



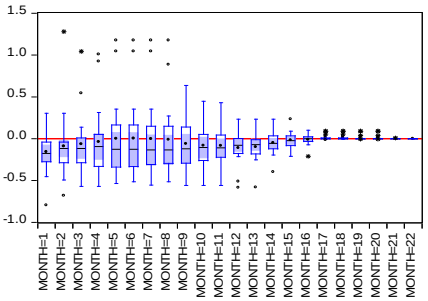
EXPORTS



IMPORTS

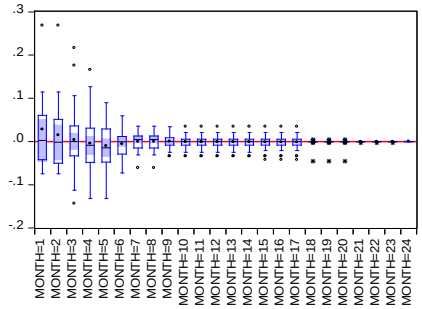


ENDING STOCKS

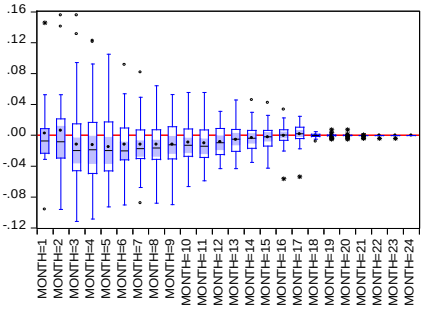


Soybeans FE: USA

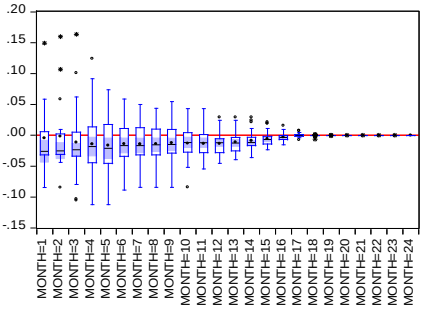
PRODUCTION



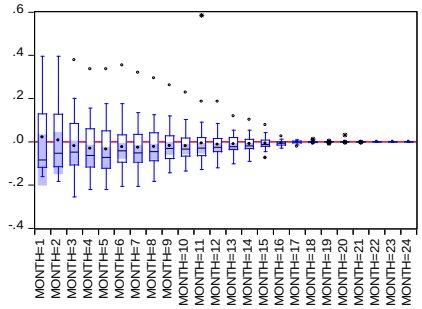
DOMESTIC USE



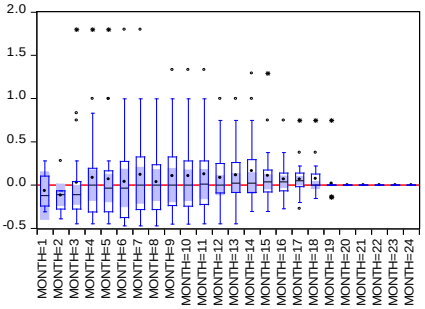
CRUSH



EXPORTS



IMPORTS



ENDING STOCKS