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## **Investigating the Divergence in Wheat Prices**

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**ERS USDA**

This study investigates whether importers of U.S. wheat form an integrated market or a series of segmented markets. Two market integration tests are applied: one based on equilibrium price relationships and one based on disequilibrium price relationships. With the exception of a few importers, both tests tend to agree. This study also seeks to explain the reasons for the wide divergence in prices paid by importers of U.S. wheat. We find that factors such as the class of wheat which is purchased and the size of annual purchases influence pricing. We also find that there continues to be large persistence difference in the prices paid by importers.<sup>1</sup>

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<sup>1</sup> The views presented in this paper are those of the authors and do not necessarily reflect the official policy of ERS or USDA.

## **Investigating The Wheat Export Price Divergence**

### **Investigating The Wheat Export Price Divergence**

A notable feature of the international wheat market is the large difference in prices paid by importers of U.S. wheat. Part of this difference in pricing reflects differences in the quality and class of wheat imported by different countries (Johnson, Grennes, Thursby, 1977, Hjort, 1988 Larue, 1991 Haley, 1995). Part may reflect the degree of competition in specific destination markets. Whatever the reason, the variation of the prices paid across different importers of U.S. wheat, itself, has changed significantly over time. For example, the cross-sectional coefficient of variation (the variance of price paid by different importers divided by the mean price) across 32 importers of U.S. wheat, stayed close to or below one one each year, from 1968 to 1972. In 1973, this measure of the variation in prices paid by importing countries rose. Over the ensuing decade it lay between 2 or 5, before falling in 1983. With the exception of the year 1987, it stayed low. Then, in the early 1990's the coefficient of variation of the price paid by different importers of U.S. wheat began to climb; reaching above 8 after the year 2005.

This study addresses the growing divergence of the prices paid by different importers of U.S. wheat. We examine the sources of this divergence and investigate if importers of U.S. wheat comprise an integrated wheat market or instead, represent a series of segmented markets. The most common explanation for the divergence in prices is that different importers purchase different classes of wheat. For example, Indonesia, primarily buys soft white wheat, Italy buys durum wheat, Mexico and Columbia purchase hard red spring wheat. This has led some economists to question whether wheat can even be considered a single commodity. For example, Haley states "although wheat probably seems to be a homogenous commodity to the uninformed, closer analysis reveals characteristics that differentiate it for a number of

end users". Yet product differentiation does not explain why the price divergence is changing since class-specific wheat prices, often move together.

Specifically, this study investigates the *relationship* between wholesale wheat prices in the U.S. and the price paid by the many different importers of U.S. wheat. In particular, we will test if the reaction of different importer's Freight on Board (FOB) prices to changes in U.S. wholesale price is similar or distinct. Therefore, we will deal with transmission of prices, an issue address by many authors including Gardner (AJAE, 1975), and Jabarra and Schwartz (AJAE, 1987). We also compare the FOB price reaction to changes in oil prices, and the volume of purchased wheat, and other factors.<sup>2</sup> An added benefit, we decompose prices into explanatory components and, thus, reveal the factor(s) behind the growing divergence of prices in destination markets.

### **Market Integration**

If wheat markets are segmented, there is little trans-shipment of wheat among destination markets, preventing prices from equalizing. This may occur if destination market purchases distinct classes of wheat. Yet even if there is trans-shipment, price equalization may not be realized if transport costs to destination markets vary or the degree of competition is different in each market. Furthermore, Barrett and Li (2002) point out that two conditions are required for price equalization: market integration and market equilibrium. That is, prices may not equalize because a market is not in equilibrium. A better indicator of market integration is a similarity in the movement of prices. We assume that if prices across destination markets respond differently to new information, markets are not integrated.

Economists have used a variety of approach to test for market integration. Our first approach is to jointly estimate a system of price transmission equations and test the restriction that price transmissions are the same across markets. This method for testing market equilibrium is closest to, but distinct from, that of Ravallion's (1985). In contrast, Barrett and Li's (2002) spatial integrated test uses Maximum

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<sup>2</sup> Anecdotal evidence supports the idea the price discounts exists for large scale buyers.

Likelihood methods to estimate a mixture distribution which exploits movement in both price and quantity data, as well as information on transfer costs. Vector Auto-regression models often compare the dynamic behavior of a different set of prices (Goodwin and Schroeder 1991a). The most common approach is to test if a group of prices are cointegrated and use this result make claims about market integration. (Goodwin and Schroeder, 1991b). Since our initial analysis rejected the hypothesis that FOB wheat prices are nonstationary (from 1969-2011) we are unable to apply cointegration methods to test for market integration.

In addition to our price transmission test, this study exploits the disequilibrium process to determine if markets are integrated. Using a *dynamic (ECM) model* we test whether FOB prices have similar rate of adjustment to equilibrium, or instead reach their equilibrium relationship with the wholesale price of U.S. wheat at different points in time. We assume that if one market is in equilibrium and the other market is in disequilibrium, then those two markets are not integrated. This disequilibrium test, which to our knowledge is unique, is designed to provide additional evidence of market segmentation beyond that provided by our system-base and PT tests.

### **A Changing Wheat Market**

At first glance, relative to all the other changes in agricultural and trade, the export of U.S. wheat has not changed dramatically in the past 40 years. U.S. exports of wheat has risen from 17.4 (15) million tons in 1967 to 27 (23) million tons in 2010. Exports peaked in the early 1980's rising to over 40 (35) million tons for several years. Over this period, long run prices have fluctuated significantly about an unchanging mean. There are two exceptions to this. Following the OPEC oil shock in 1973 the price jumped significantly for all destination markets. It fluctuated about a new mean for over 30 years.<sup>3</sup> In

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<sup>3</sup> FOB wheat prices, were on average, 280% higher for destination markets in 1974, than they were for 1972.

2007 and 2008 wheat prices rose significantly to all destination markets before falling and rising again.<sup>4</sup> However, what stands out is the relatively small change in long run prices from 1974 until 2008. At first glance the wheat market appears to have been stable.

Yet, a more detailed look reveals that there have been significant changes in the wheat market. From 1967 to 1971 the top buyers of U.S. wheat were India, Japan, Pakistan, Brazil, and Korea. From 2008 to 2012, the top buyers were Japan, Nigeria, Mexico, Egypt, and the Philippines. By 2012 both India and Pakistan were exporting significant quantities of wheat. And three former members of the USSR, Kazakhstan, Russia, and Ukraine, have significantly increased wheat exports over the past decade (Liefert and Liefert). And these changes appear to be ongoing. For example, the top destination markets for U.S. in 1988-1992, were the USSR, China, Japan, Egypt, and Korea, different from both the top markets of both the early 1970's and the past decade.

For the U.S, another significant development is the growing difference in the prices paid by different importers of U.S. wheat. As early as the 1990's, the coefficient of variation of prices paid by different importers of U.S. wheat began to rise significantly. In recent years Israel, Italy, Taiwan, the Netherlands (a transshipment market) paid well over \$280 a ton for wheat while, Algeria, Bangladesh, China and Sri-Lanka paid under \$204 a ton. There even is a breakout in the price response to market changes. The cross-sectional coefficient of variation, of the 2006-2008 percentage price jump was .157. In other words, as the price of wheat rose around the world in 2007 the effect on the price paid by importers of U.S. wheat was uneven across markets.

Several reasons have been put forward to explain the variation in prices paid by importers of U.S. wheat. First and foremost, it has been emphasized, that different countries purchase different classes of wheat (Johnson, Grennes, Thursby, 1977, Hjort, 1988, Larue, 1991, Haley, 1995). For example, Korea primarily buys soft white wheat, Italy buys durum wheat, and while Dominican Republic primarily buys

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<sup>4</sup> FOB wheat prices, were on average, 120% higher for destination markets in 2008, than they were for 2007.

hard red spring wheat. Second, some countries, notably Japan, sign long run purchase contracts based on price expectations that may not be borne out, in later contract years. Others countries buy on the spot market. Third, countries often receive a price discounts when they make exception large purchases. Fourth,<sup>5</sup> the degree to which the U.S. competes with other wheat exporting nations, varies across destination markets which influence pricing (Arnade and Pick, 1999). For example, Japan buys wheat from Argentina, Australia, Canada, and well as the United States. North African markets often purchase European (French wheat), while the U.S. and Argentina primarily compete in South American markets. And the degree of competition can vary across time. For example, in the Mid-East and North Africa U.S. exports must now compete with the recent surge in wheat exports from Russia and Ukraine.

The observation that there are significant differences in the price paid by importers of U.S. wheat and the wide number of competing explanations for this divergence in price, suggests that it would be fruitful to examine the sources of this price divergence. In the very least it would be useful to establish if countries which import U.S. wheat form an integrated market. A variety of methods are available for testing for whether a market is integrated, (Barlett and Li (2002), Goodwin and Schroeder, 1991a, 1991b Ravallion,(1992) Arnade and Osborne 2004). Each of these methods rely on different assumptions, requires different data, and each suffers different limitations. In this paper, a system of FOB price equations are estimated and tests are used to determine if FOB prices for various importing countries react differently to changes in the wholesale price of U.S. wheat; the key input for any trading company. Our price equations are specified as a function of a number of variables, which allow us to highlight the critical factors behind the divergence in wheat prices. In the following section, we discuss our data. This is followed by sections that discuss our methods and our results.

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<sup>5</sup> Most countries (the exception being China) are not be able to exercise buying (oligopsonistic) power, or buy enough wheat to raise prices everywhere.

## Data

The US Department of Commerce Data base contains the quantity and value of U.S. wheat exports to 179 countries from 1967 to 2011. Using this data, 30 top destination markets were singled out for analysis. To pick the top markets, countries were ranked by export volumes over the periods: 1967 to 1972, 1972 to 1992, 1992 to 2002, and again from 2002 to 2011. Countries making up the top 15 destination markets over the period (2002-2011) were first selected for analysis. Then the 8 top markets (which were not already among first 15 choices) from 1992 to 2002 were selected. Following 4 top ranking countries (not yet chosen) from 1972 to 1992 were picked. And 3 top destination markets from the first period were selected.

Export unit values (EUV) were used to represent the FOB price; which does not explicitly contain import tariffs and shipping expenses. However, FOB prices can reflect *expected* shipping costs and other expenses. Several countries (Iran, Iraq, India) did not import U.S. wheat for years so that an EUV for those years was not available. There are sophisticated ways calculate a “virtual” or “choke” price which represent price consistent with a zero quantity demanded, or supplied (Hausman,1997). However, methods for obtaining a virtual price can be unstable. Therefore, for country-year observations where no price data was available, we took the average of the two lowest and next two lowest country EUVs for that year, We then took the difference between the “lowest” and “next lowest” EUV’s and subtracted that from the lowest EUV’s to obtain our “synthetic price” estimate. This assumes that if the United States did not sell wheat to a country in a particular year, it was because the price the importer was willing to pay was too low, Our subsequent models used a dummy/price interaction variable on observations where, a “synthetic” price had been created, in order to isolate those country/year pairs from the rest of the model.

In carrying out this study we will allow factors such as, the quantity of wheat sold, (to control for scale effects), oil prices (to control for shipping costs), wheat quality, and wheat class to influence the price



paid by importers. Oil price data was obtained from [inflation.data.com](http://inflation.data.com). Monthly ERS (USDA) wholesale prices, representing various class of wheat (Illinois, hard red spring, Portland Soft white, Durum ) were aggregated to match the annual values consistent with the commerce export data. In our second round of estimation, per capita GNP (from Penn World Tables) of the importing nation was used to represent any differences in wheat quality not already contained in the different class of wheat. In using this variable we assume that higher income consumers purchase a higher quality of wheat.

### **Testing for Price Differences**

In the following sections we estimate the relationship between U.S. wholesale prices and the prices paid by different importers of U.S. wheat. Our aim is to determine if different FOB prices respond similarly to changes in U.S. wholesale prices. If not, then this would be some indication that destination markets are not integrated. That is, in an integrated market, prices should respond similarly to new information (Arnade and Osborne, 2004).

Regression equations were set up to test for differences in price transmission coefficients across markets. The FOB price of the destination market served as the dependent variable and a wholesale U.S. wheat price served as the key exogenous variable. For this first round of testing the wholesale price of U.S. wheat was represented the same variable in all equations. (an average of: Kansas City hard red winter average protein, Kansas city 13% protein, and Minneapolis dark Northern spring 13% protein). The following shift variables were included in the equations: lagged FOB price (controlling for long term contracts), oil prices (controlling for expected shipping costs), the quantity sold to that destination market, (controlling for a scale-based pricing and perhaps a market power effect), and in some cases a dummy variable. The dummy variable represented those years, where the synthetic unit value, a low price, was created and is meant to prevent a poor synthetic

EUV estimate from corrupting the estimated transmission coefficient. One equation was estimated for every destination market. A two equation version of the system would look like:

$$1a) P_{1t} = \beta_{11}P_{1t-1} + \beta_{12}WP + \beta_{13}P_{o1l} + \beta_{14}Q_{1t} + \beta_{15}Dm + e_{1t}$$

$$1b) P_{2t} = \beta_{21}P_{1t-1} + \beta_{22}WP + \beta_{23}P_{o1l} + \beta_{24}Q_{1t} + \beta_{25}Dm + e_{2t}$$

where the over-script is meant to emphasize that the variables are in logs.

Altogether our system consisted of 30 FOB price equations. To this 5 “other” prices were added to the system: competing exporter prices, Australia, Argentina, Rotterdam, Canada, (obtained from ERS) and the U.S. flour price. Flour prices were included because the domestic processing market can be viewed as an alternative “destination” for wholesale wheat. That is a buyer of wholesale wheat, in the United States, can choose to ship the wheat to any number of exporters, or, instead, sell the wholesale wheat to food processors in the United States. All variables were put into logs.

Several systems of equations were estimated<sup>6</sup>. First, a system with 35 equations representing all 35 prices was estimated. Each dependent price was regressed on same exogenous variables. However, for the equations representing the 5 “other” prices (competing suppliers and flour) the right hand side did not have quantity variable. Three variations of this complete system was estimated: one representing all 35 prices, one representing 30 FOB prices and the U.S. flour price, and another system containing just the 30 FOB equations.<sup>7</sup>

Each of these systems was estimated twice. The first time it was estimated with a restriction that the coefficient on the price transmission was the same in every equation (ie.  $\beta_{12} = \beta_{22}$ ). Then the system was re-estimated without the restriction. A likelihood ratio test (see Greene, 1993) was used

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<sup>6</sup> Unit root tests for all FOB prices rejected the nonstationary null hypothesis over the years 1974 to 2007, and rejected nonstationary for most FOB prices for the periods 1968 to 2011. Thus cointegration methods testing market integration could not be used.

<sup>7</sup> Equations represented 29 top markets and one aggregation of “all other” markets.

to determine if the restriction seriously changed the system fit. If the restriction *significantly* reduces the fit of the system, then it is viewed as being false and is rejected. If it is rejected, then the PT transmission coefficient is significantly different for markets represented in the system of equations.

The top 3 lines in table 1 show that we can reject the null hypothesis of equal price transmission for the 35, 31, and then for 30 export markets. Having rejected similarity of transmission across all markets, we investigated whether PT transmissions were the same within specific submarkets. A system of equations was estimated for 9 Latin American markets, a system for other third world markets; once with the former Soviet Union and China included, and again without the former Soviet Union and China included. A system was estimated for East Asian markets; once with and once without China. Another system representing East Asia without the Philippines and Indonesia was estimated. And a system for developed countries was estimated; once with and once without, Korea and Japan.

Test statistics in Table 1 reveal that we cannot reject equal wholesale-to-FOB price transmission coefficients for Latin American markets; indicating that the Latin American wheat market is integrated. Similarly, 3 advanced countries outside Asia, (Netherlands, Italy, Israel) appear to form an integrated market. The competing suppliers (Argentina, Australia, Canada), and wholesale prices in Rotterdam, and U.S. flour prices also react similarly to changes in the U.S. wholesale price. Thus a few small submarkets of importers appear to be integrated, while the larger group of destination markets are not.<sup>8</sup>

The first column in table 2 reports price transmission elasticities estimated from the unrestricted 35 equation model. In this model the wholesale price of wheat in the United States was represented by a common variable: a three price average of Kansas City hard red winter average protein, Kansas City hard red winter 13% protein and Minneapolis dark Northern spring 13% protein. There is complete pass-through from wholesale to the FOB price for a few markets: Chile, Morocco and the Netherlands, (a transshipment market). Many PT elasticities are only slightly less than one (Bangladesh, Korea, Taiwan). The Soviet Union (past 1992, a former USSR aggregate) the PT elasticity is extremely low at

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<sup>8</sup> Estimated models can be provided upon request.

.260. Transmission elasticities for China, Israel, Nigeria, fall below .75. Transmission elasticities for prices that do not represent export markets, (U.S. flour price, Argentine, Australia, and Rotterdam price) are near or below .75. Later, we discuss the very different set of PT elasticities that emerge when wheat markets are differentiated by class.

## **Disequilibrium**

The price transmissions test provides evidence that these destination wheat markets are not integrated. In this section we compare the disequilibrium component of the wholesale-FOB price relationships. In particular, estimated an error correction model (ECM) using a two-step approach (Engle and Granger, 1987). Equation 1 represents the long run equilibrium relationships among the endogenous and exogenous variables. Estimation of these equations can be viewed the first step of ECM estimation. We estimated the 2<sup>nd</sup> step disequilibrium component of an ECM model using first differenced data and compared the rate which prices adjust to their equilibrium relationship.<sup>9</sup> Notably, we *test for differences in the rate of adjustment among the different destination markets*, to equilibrium. A significant difference in adjustment rates would imply that some markets are in equilibrium while other markets are in disequilibrium; which provides evidence that markets not integrated. At first, this claim seems to ignore the Barlett and Li (2002) warning about confusing market integration and disequilibrium. Yet, Barlett and Li argued against using the law of one price to test for market integration; a valid point when

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<sup>9</sup> Unit roots found most FOB price series were stationary. Therefore we estimate the rate of adjustment to a long term price level rather than to a long run price trend. That is, even in a stationary series, disequilibrium exists.

all prices are in disequilibrium. Our argument applies to situations when some prices *are* in equilibrium and some *are not* in equilibrium.<sup>10</sup> In any case our ECM equation for market 1 was specified as

$$.2)\nabla P_{1t} = A_{11}\nabla P_{1t-1} + A_{12}\nabla WWP + A_{13}\nabla Poil + A_{14}\nabla Q_{1t} + A_{15}\nabla Dm$$

$$-\gamma_1(P_{1t-1} - \beta_{11}P_{1t-2} + \beta_{12}WP_{t-1} + \beta_{13}Poil_{t-1} + \beta_{14}Q_{1t-1} + \beta_{15}Dm_{t-1}) + u_{1t}$$

Equation 2 can be written more simply as:

$$3)\nabla P_{1t} = A_{11}\nabla P_{1t-1} + A_{12}\nabla WWP + A_{13}\nabla Poil + A_{14}\nabla Q_{1t} + A_{15}\nabla Dm - \gamma_1 e_{1t-1} + u_{1t}$$

where  $e_{1t-1}$  is the lagged error term of the long run equilibrium component of the model and  $\gamma_1$  is a coefficient on the lagged long run error, which measures the speed of adjustment to market equilibrium.

To test for equal adjustment rates, we jointly estimated equation 3 as a *system* of price difference equations<sup>11</sup>, and using cross-equation restrictions, we tested whether the adjustment rate (to equilibrium) was the same across markets. (That is we test whether  $\gamma_1 = \gamma_2 = \gamma_3 = \dots$ ). As with the test for equality of PT transmissions, we tested for all 35 prices, and the same list of submarkets.

Table 3 reports the tests for equality of adjustment rates. The large systems representing 35, 31, and 30 markets strongly rejected the restriction that all prices have same rate of adjustment to equilibrium. Yet, for Latin America, it was not possible to reject the restriction that each market adjusts to equilibrium at the same rate. Similarly the advanced economies, with and without Japan, appear to have the same

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<sup>10</sup>In an integrated market, it may be possible for some prices to be in equilibrium and others are not for short periods of time. However, it would be difficult to argue that if this situation persists, the two set of prices belong to a single integrated market.

<sup>11</sup> The equations in 1 represent the first stage of our ECM system.

adjustment rate; though we could reject equal adjustment rates at the .1 level when Japan is included.

We can clearly reject equal adjustment rates among all third world countries, whether, China and Russia are included or not. The story is less certain with East Asia markets. When China and the Philippines are excluded the restriction that all markets adjust to their long run equilibrium relationship at the same rate can be rejected with 90% confidence.

What stands out when comparing the PT transmission tests and the disequilibrium adjustment rate tests, is that behavior of non-FOB prices; (competing suppliers: Australia, Argentina, Canada, Rotterdam, and U.S. flour). Market integration tests are different in the equilibrium model and disequilibrium model.

When estimating the equilibrium PT equations, these prices reacted similarly to a change in the wholesale price of wheat. Yet, when estimating the disequilibrium equations, the restriction that these five prices adjust to equilibrium at similar rates was strongly rejected. The short-run fixity of supplies may limit the ability of competing suppliers to quickly adjust to disequilibrium shocks. Yet, this does not fully explain, how these prices can react the same to a change in the whole-sale price of U.S. wheat.

### **Decomposing the Export Price into its Explanatory Factors**

Each FOB price was decomposed into its explanatory components to highlight the factors that may be causing prices to diverge. Using a specification similar to equation 1, a series of single price equations were estimated. Several variables were added to account for product quality, product differentiation, and the degree of competitiveness in destination markets. We estimated these equations twice, once with a generic wholesale price of wheat and once with the class wholesale price of U.S wheat, representing the class of wheat which each importing country primarily buys. To account for product quality beyond that contained in the prices of differentiated wheat products, importers per capita GNP (from Penn World Tables) was added as an explanatory variable. In choosing this variable, we assume that higher income consumers purchase a higher quality of wheat. The share

that U.S. imports make up of each destination market's total imports also was added, as rough means to account of oligopolistic price mark up.<sup>12</sup>

In a second round of estimation the U.S. wholesale prices, was represented by the price of the class of wheat, which countries primarily import. For example, Korea and Indonesia primarily purchase soft white wheat, Italy durum wheat, Chile and Columbia Israel, Nigeria, hard red winter, the Dominican Republic and the Philippines hard red spring wheat. As before, a dummy variable was included to prevent a possible poor synthetic unit value estimate from corrupting the estimate of the transmission coefficient. Also included in these equations was a relative share variable meant to capture a market power effect.

The price decomposition equations were estimated using OLS. One reason for using OLS, is that this round of estimation did not require the imposition of cross equation restrictions and we did not want an imperfect assignment of a wheat-class to one market (one equation) to contaminate other equations where the chosen class of wheat might be an exact match for the destination market.<sup>13</sup>

To decompose the price each estimated coefficient was multiplied by a level of the variable itself.

Summing up across all terms, including the error, produces:

$$4) P_{1,t} = \beta_1 + \beta_{11}P_{1t-1} + \beta_{12}WP_1 + \beta_{13}Poul + \beta_{14}Q_{1t} + \beta_{15}Dm + \beta_{16}pgnp + \beta_{17}shr + e_{1t}$$

where parameter hats represent estimate values.

Note in equation 4 the wholesale price of wheat (WP) is subscripted to emphasize that a different class of wheat is sold to different destination markets. In the first estimation (generic model) we used the

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<sup>12</sup> We had specified up a formal price-markup-over marginal cost equation. Included in this model was a Lerner oligopoly power index, accounting for conjectural variations and import demand elasticities. The price markup equation and two import demand equations were jointly estimated; accounting for key cross equation restrictions. This nonlinear model failed to converge for approximately half of the markets. In this paper, we report a simple linear model, which provides a rough estimate of the oligopoly power effect.

<sup>13</sup> Many markets import several types of wheat. Our choice of wheat-class was to meant to capture the class of wheat which a country imports.

same wheat price variable,( a three price average of Kansas City hard red winter average protein, Kansas City hard red winter 13% protein and Minneapolis dark Northern spring 13% protein) that we had used in the market integration test. Then, we estimated the same model, but for each destination market equation using a distinct class-specific wholesale price of wheat as an explanatory variable. The components of the wheat price can be written as:

$\beta_{11}P_{1t-1}$  = the persistence effect (long term contracts)

$\beta_{12}WP_1$  = the wheat purchase price (a key input cost to traders)

$\beta_{13}P_{oil}$  = the oil price effect (a key input cost)

$\beta_{14}Q_{1t}$  = the purchase scale effect

$\beta_{16}pgnp_{1t}$  = percapita gnp, a quality effect (quality assumed to rise with income)

$\beta_{17}shr$  = the oligopoly power markup effect

The dummy variable and error term represent the synthetic price effect and unknown effects, respectively. The constant  $\beta_1$  contains the unchanging cost of producing and marketing wheat. The constant also may contain a long run persistence effect beyond that represented by the  $\beta_{11}P_{1t-1}$  term, as well as a long run quality effect, not captured in wheat class and per capita GNP variable. Note, that a decomposition of the log of a wheat price does *not* represent the decomposition of the wheat price itself. That is, by specifying the price equation in logs we assume variables interact in a nonlinear fashion to establish a price.<sup>14</sup>

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<sup>14</sup>The time derivative of equation 4 produces growth rate decomposition:  $P_{1,t} = \beta_{11}P_{1,t-1} +$

$\beta_{12}WP_1 + \beta_{13}P_{oil} + \beta_{14}Q_{1t} + \beta_{15}Dm + \beta_{16}(shr) + e_{1t}$  where  $P_{1,t} = \delta P_1 / \delta t = \frac{\delta P_1}{\delta t} * (\frac{1}{P_t})$



Table 4, reports the decomposition of the log of the prices into its estimated components for each destination market. What stands out is the dominant role of the constant term. This indicates, that a significant determinant of the wheat price are long run factors, such long run contracts, the unchanging component to the cost of producing wheat (distinct from fixed costs, that is a unchanging component of variable costs), transportation costs, and tariff barriers. The later two factors would vary across markets, as does the constant term.<sup>15</sup> As would be expected, the wholesale price of wheat, an exporters' key input cost, is the second major component of the FOB price. The Oil price and non-competitive price markups registered as minor components FOB prices. The scale effect is quite large and negative; particularly for Israel and Taiwan. This finding is consistent with anecdotal evidence supports the idea that there are price discounts for large purchases.

### **The Wheat Class Effect**

We re-estimated equation 4 using the price of the appropriate wheat class serving as an explanatory variable. Class-specific wholesale prices were chosen to match the each importer's primary import product. For example, Korea and Indonesia primarily purchase soft white wheat, Italy durum wheat, Chile and Columbia Israel, Nigeria, hard red winter, the Dominican Republic and the Philippines hard red spring wheat.

Columns 4 and 5 of table 2 compares the class-specific price transmission elasticities for the two sets of OLS estimated models. Transmission elasticities for the equations which were estimated using the specific wheat class prices, were notably lower. To investigate how product differentiation might influence the whole-sale price component of the OLS estimate model, this component of the FOB price, itself, was decomposed into two components: differences arising from in differences transmission rates

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<sup>15</sup> We used cross equations restrictions to test if the constant was the same across all equations and again, across equations representing those importers that purchase the same class of wheat. With the exception of importers of hard red spring wheat and the two importers of soft red wheat, the tests revealed that constant terms were significantly different among equations.

and differences arising from differences in the prices of distinct wheat classes. That is, call the parameter on the wholesale price of the generic model  $\beta_{12}$ . Call the same parameter for the model which allows each destination market equation to have its own class-specific whole-wheat price  $A_{12}$ . Take the difference in the wholesale price component of the generic price model and the class-specific price model and add zero or:

$$5) d = \beta_{12}WP - A_{12}WP_i + zero = (\beta_{12}WP - A_{12}WP_i) + (A_{12}WP - A_{12}WP)$$

where  $WP_i$  (subscripted) represents the wholesale price of a specific class of wheat

Equation 5 can be re-arranged to:

$$6) d = (\beta_{12} - A_{12})WP + A_{12}(WP - WP_i)$$

The first term in 6 represents FOB price difference arising from dissimilar wholesale-FOB transmission coefficients. The second term represents FOB price differences arising from the difference in the prices of different classes of wheat.

Column 1 of table 6 lists the average model difference (for each destination market) of the estimated wholesale price effect on FOB prices. That is, the wholesale price effect of class-specific models was subtracted from the wholesale price effect of the generic model. For most destination markets this effect is positive meaning that using a generic wholesale wheat price led us to overestimate the whole-sale price component of FOB prices. Column 2 lists the part of this difference which arises from different transmission coefficients between the two models. Column 3 lists the difference arising from the fact that class-specific wheat prices and the generic price of domestic wheat is different. Overall, the difference in estimated PT, coefficients (elasticities) between models dominates any difference arising from a differences in prices of specific classes of wheat and the generic price of wheat (represented by an average of Kansas City hard red winter average protein, Kansas city 13% protein, and Minneapolis dark Northern spring 13% protein).

When accounting for product differentiation, not only were price transmission elasticities significantly different between models but for several destination markets, the influence of the “quantity purchased” on price, changed significantly. A fourth column in table 6 reports the difference in model estimates of the quantity effect. In general this difference is negative meaning a model that uses the generic wholesale price underestimates the quantity effect.<sup>16</sup> In several cases, (Algeria, Japan, and Israel) the change in the quantity effect is so large that a significantly negative quantity effect turns into a significantly positive quantity effect.

At first, this result did not make sense. However, upon reflection we realized there is one explanation which is consistent with this result. There are two ways that an FOB wheat prices can be influenced by how much wheat the importer buys. One, importers receive a discount for making large purchases. This explains the negative effect that the quantity variable has on FOB price in the generic model. On the other hand large importers with market power can drive up prices by increasing their purchases. It may be that an importing country is only large enough to have market power for *a particular class* of wheat (a subset of wheat sold). This argument is made more potent by the fact that Japan, a large wheat buyer, is one of the models where the quantity effects switches from negative to positive when the generic whole-sales prices is replaced with a class specific price.

## **Conclusion**

There is no single price paid by international buyers of U.S. wheat. And the difference in importer’s purchase price has grown over the past decade. This paper found that importers do not belong to a single integrated market, but instead belong to several submarkets; such as that composed of Latin American importers of U.S. wheat. In testing for market integration, we first evaluated long run

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<sup>16</sup> In fact, in most cases, the generic model overestimates the size of its negative influence. That is, a class-specific model produces a smaller negative effect that purchase scale has on FOB prices.

equilibrium relationships among prices and second, compared the adjustment process of prices to their long run equilibrium. For countries that import U.S. wheat the test results agreed.

We also decomposed export prices into their explanatory component and uncovered a consistent, perhaps permanent, difference in the prices importers of wheat pay. The class or type of wheat that importers buy, explains some of the difference in prices. The quantity of purchased wheat matters, larger purchases lead to lower prices. Differences in U.S. share of the destination market, which is related to the degree of competition faced in each market, did not seem to have much influence on price. Oil prices, a proxy for expected transport cost, appeared to explain only a minor component of the price difference. And the price persistence effect, (a short run persistence effect), as measured by a influence of lagged price variable, varied considerably among buyers.

No doubt, further analysis will be able to provide more detail. In the future we hope to exploit more refined methods for evaluating influence of the degree of competitiveness in the destination market on prices (oligopolistic markups). And we hope to investigate why there is a consistent, or even permanent, difference in wheat prices. And we plan to work out a method for dealing with importers that import several classes of wheat; classes with an import share that may be changing over time. Finally, in the future, we would like to evaluate different time periods and in the process reduce problems encountered by including years when buyers purchase no U.S. wheat.

**Table 1: Likelihood Ratio Tests For Equal Transmissions**

	$\chi^2$ value	DF	
All prices	71.34	34	***
All Fob+Flour prices	133.86	30	***
All Fob Price only	142.06	29	***
Latin American	8.88	8	
Third World-with-			
Russ/China	49.66	15	***
Third World-w/o-			
Russ/China	39.26	13	***
East Asia with			
Phil/China/Indo	16.71	7	**
East Asia w/o			
Phil/China/Indonesia	16.13	4	***
Advanced Countries	30.48	6	***
Advanced Countries w/o			
Japan/Korea	5.70	4	
Other(Argentina,			
Australis,Canada,			
Rotterdam)	0.43	4	
Other-with Flour	0.46	5	

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1/ Tests statistics are  $\chi^2$  distributed with the degrees of freedom (DF) equal to the number of restrictions(price transmission coefficients set to be equal).

2/ \*\*\* significant at .01 level, \*\* at the .05 level, \* at the .1 level. At .01 (.05) significant we can be 99% (95%) confident) the wholesale to FOB price transmission coefficient is significantly different among the markets contained in the system. For example, the LLR statistic is 71.34 indicates we can reject the null hypothesis that all prices have the same transmission coefficient (elasticity in this case). However the Latin American LLR statistic is 8.882 and when cannot reject the hypothesis that transmission coefficients (elasticities) are the same to all Latin American countries. This indicates Latin American markets may be integrated while other markets are not.

**Table 2. Price Transmission Elasticities**

-----System Model-----						
	<u>Estimate</u>	<u>Confidence</u>	<u>Interval</u>	<u>OLS</u>	<u>OLS</u>	
All Restricted	0.810	0.832	0.788	<u>Model</u>	<u>Model</u>	
Countries		High	Low	Generic	Class	Class
Algeria	0.819	0.976	0.661	0.848	0.455	Durum
Bangladesh	0.932	1.036	0.829	0.922	0.950	Hard Red Spring
Brazil	0.940	1.110	0.771	0.904	0.471	Hard Red Winter
China	0.746	0.981	0.510	0.791	0.618	Soft Red Winter
Chile	1.023	1.197	0.849	1.034	0.708	Hard Red Spring
Columbia	0.921	1.021	0.821	0.893	0.449	Hard Red Winter
Dom Rep	0.786	0.885	0.688	0.750	0.796	Hard Red Spring
Egypt	0.866	1.033	0.700	0.750	0.817	Soft Red Winter
Guatemala	0.852	0.935	0.769	0.829	0.439	Hard Red Winter
India	0.875	1.156	0.593	0.735	0.626	Soft White
Indo	0.779	0.901	0.656	0.804	0.825	Soft White
Iran	0.864	1.107	0.622	0.765	0.358	Hard Red Winter
Iraq	0.874	1.045	0.703	0.924	0.360	Hard Red Winter
Israel	0.707	0.802	0.612	0.685	0.513	Hard Red Winter
Italy	0.808	0.912	0.703	0.826	0.136	Durum
Japan	0.891	0.962	0.821	0.862	0.890	Hard Red Spring
Japan II	same	Same	same	same	0.830	Soft White
Korea	0.988	1.062	0.914	0.959	0.954	Soft White
Mexico	0.884	1.066	0.702	0.846	0.338	Hard Red Winter
Morocco	1.048	1.188	0.909	0.998	0.517	Hard Red Winter
Netherland	1.000	1.228	0.772	1.229	0.352	Hard Red Winter
Nigeria	0.720	0.865	0.576	0.724	0.320	Hard Red Winter
Pakistan	0.971	1.138	0.804	0.972	1.030	Soft White
Peru	0.882	0.990	0.774	0.857	0.502	Hard Red Winter
Philippines	0.791	0.881	0.700	0.812	0.834	Hard Red Spring
Sri Lanka	0.565	0.743	0.387	0.684	0.678	Soft White
Taiwan	0.939	1.024	0.853	0.888	0.453	Hard Red Winter
Thailand	0.762	0.857	0.666	0.742	0.376	Hard Red Winter
Ussr/Former	0.260	0.827	-0.306	0.443	0.553	Hard Red Spring
Venezuela	0.911	1.023	0.799	0.858	0.375	Hard Red Winter
other/ c	0.961	1.051	0.872			
Argentina	0.770	0.947	0.796			
Australia	0.733	0.859	0.695			
Canada	0.875	0.965	0.566			
Rotterdam	0.669	0.779	0.386			
FLOUR	0.578	0.810	0.663			

1/ The system model was estimated from an unrestricted version of a system of transmission equations. In this and the first OLS regression the same variable represented U.S. whole price.

**Table 3: Likelihood Ratio Tests For Equal Adjustment Rates**

	$\chi^2$ value	DF	
All prices	161.04	34	***
All Fob+Flour prices	1689.5	30	***
All Fob Price only	1282.5	29	***
Latin American	8.45	8	
Third World-with-			
Russ/China	452.04	15	***
Third World-w/o-			
Russ/China	32.16	13	***
East Asia with			
Phil/China/Indonesia	18.98	7	**
East Asia w/o			
Phil/China/Indo	8.55	4	*
Advance Countries	6.96	6	
Advance Countries w/o			
Japan/Korea	7.1	4	*
Other(Argentina,			
Australia,Canada,			
Rotterdam)	34.68	4	***
Other-with Flour	85.59	5	***

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1/ Tests statistics are  $\chi^2$  distributed with the degrees of freedom (DF) equal to the number of restrictions(price transmission coefficients set to be equal.

2/ \*\*\* significant at .01 level, \*\* at the .05 level, \* at the .1 level. At .01 (.05) significant we can be 99% (95%) confident) the wholesale to FOB price transmission coefficient is significantly different among the markets contained in the system. For example the LLR statistic is 161.04 indicates we can reject the null hypothesis that all prices have the same rate of adjustment to equilibrium However the Latin American LLR statistic is 8.55 means we cannot reject that adjustment rates are the same to all Latin American countries. This indicates Latin American markets may be integrated while other markets are not.

**Table 4: Estimated Adjustment Rates to Equilibrium**

Country	Speed of Adjustment	---Time to reach equilibrium---		
		Years <u>Estimated</u>	Confidence Interval <u>High</u>	<u>Low</u>
Algeria	-0.695	1.44	1.58	1.32
Bangladesh	-1.063	0.94	1.05	0.85
Brazil	-1.372	0.73	0.81	0.67
China	-0.748	1.34	1.53	1.19
Chile	-0.274	3.66	4.95	2.90
Columbia	-0.753	1.33	1.50	1.19
Dom Rep	-1.110	0.90	1.01	0.82
Egypt	-0.793	1.26	1.38	1.16
Guatemala	-0.760	1.32	1.45	1.21
India	-0.419	2.39	3.17	1.91
Indo	-1.130	0.88	0.96	0.82
Iran	-1.590	0.63	0.73	0.55
Iraq	-0.550	1.82	2.19	1.55
Israel	-0.806	1.24	1.35	1.15
Italy	-1.372	0.73	0.77	0.69
Japan	-1.292	0.77	0.83	0.72
Korea	-0.717	1.39	1.56	1.26
Mexico	-0.826	1.21	1.45	1.04
Morocco	-0.810	1.23	1.43	1.09
Netherland	-1.245	0.80	0.88	0.74
Nigeria	-0.621	1.61	1.88	1.41
Pakistan	-0.796	1.26	1.36	1.17
Peru	-0.904	1.11	1.21	1.02
Philippines	-1.072	0.93	1.01	0.87
Sri Lanka	-1.269	0.79	0.87	0.72
Taiwan	-0.762	1.31	1.45	1.20
Thailand	-1.009	0.99	1.09	0.91
Ussr/Former	-1.006	0.99	1.09	0.92
Venezuela	-0.749	1.34	1.46	1.23
all other	-0.594	1.68	1.87	1.53
Competitors				
Argentina	-0.783	1.28	1.54	1.09
Australia	-0.742	1.35	1.50	1.22
Canada	-0.310	3.23	4.17	2.64
Rotterdam	-1.656	0.60	0.64	0.57
US FLOUR	-1.344	0.74	0.84	0.67

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1/It takes 1.44 years for Algerian Prices to return to it long run equilibrium relationship.



**Table 5: Decomposition of the Log of Price**

Year	<u>Ln(P)</u>	<u>Prsist</u>	<u>Scle</u>	<u>U.S</u> <u>Price</u>	<u>Oil</u>	<u>Dum</u>	<u>Qualt.</u>	<u>OP4</u>	<u>Fixed</u>	<u>Error</u>
Algeria										
1970-1990	4.86	1.23	-1.59	1.02	0.35	0.00	-0.10	0.11	3.82	0.01
1991-2011	5.10	1.29	-1.45	1.27	0.45	-0.08	-0.22	0.04	3.82	-0.02
Bangladesh										
1970-1990	4.79	-0.06	0.16	1.11	0.08	0.01	0.05	-0.03	3.47	0.004
1991-2011	5.04	-0.07	0.16	1.38	0.10	0.01	0.00	-0.02	3.47	-0.004
Brazil										
1970-1990	4.82	0.53	0.21	1.09	-0.03	-0.01	0.10	0.10	2.82	0.008
1991-2011	5.04	0.56	0.16	1.35	-0.04	-0.01	0.19	0.01	2.82	-0.004
China										
1970-1990	4.69	1.00	-0.24	0.95	0.36	-0.14	0.06	-0.01	2.71	0.001
1991-2011	5.07	1.08	-0.30	1.18	0.45	0.00	-0.05	0.00	2.71	0.003
Chile										
1970-1990	4.87	-0.06	0.04	1.25	0.16	-0.02	-0.07	-0.01	3.56	0.029
1991-2011	5.01	-0.07	0.04	1.55	0.20	-0.01	-0.22	-0.01	3.56	-0.025
Columbia										
1970-1990	4.84	0.40	-1.86	1.08	0.10	0.00	0.08	0.30	4.74	0.005
1991-2011	5.12	0.42	-1.87	1.33	0.13	0.00	0.19	0.17	4.74	-0.001
Dominican Republic										
1970-1990	4.95	1.34	-1.23	0.90	0.09	0.00	0.01	0.13	3.71	0.000
1991-2011	5.23	1.42	-1.28	1.12	0.11	0.00	0.03	0.12	3.71	0.000
Korea										
1970-1990	4.87	0.66	-1.10	1.15	-0.01	0.00	-0.01	0.04	4.13	0.004
1991-2011	5.16	0.71	-1.07	1.43	-0.02	0.00	-0.03	0.02	4.13	-0.004
Japan										
1970-1990	4.89	0.97	-1.25	1.04	0.08	0.00	-0.03	0.05	4.03	0.000
1991-2011	5.23	1.03	-1.25	1.29	0.10	0.00	-0.04	0.05	4.03	0.000
Egypt										
1970-1990	4.78	0.76	0.01	0.98	0.29	0.00	0.01	-0.03	2.74	0.006
1991-2011	5.01	0.80	0.02	1.22	0.37	0.00	-0.07	-0.06	2.74	-0.005

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1/In the first column Ln(P) is the log of price which equals the sum of the effects listed in columns 2 through 9. These items are Persistence (lag log price), Scle (scale or quantity), Class Price (the wholesale price of the class of wheat purchased), oil (oil prices) dummy (controlling for synthetic price observations), Qualt, (Quality represented by per-capita GNP of buying country), op (level of completion in destination market), fixed (a constant representing perhaps, a fixed cost, permanent quality, long run persistent differences) and an error.<sup>2/</sup> Each component reflects the impact of coefficient on the variable, as well as the level of the exogenous variable (the whole-sale price effect:  $\beta_{12}WP_1$ )

Table 5  
(contin)

Year	<u>Ln(P)</u>	<u>Prsist</u>	<u>Scle</u>	<u>Class</u> <u>Price</u>	<u>Oil</u>	<u>Dum</u>	<u>Quality</u>	<u>OP4</u>	<u>Fixed</u>	<u>Error</u>
Guatemala										
1970-1990	4.94	0.75	-0.85	1.00	0.10	0.00	0.05	0.17	3.71	0.003
1991-2011	5.18	0.79	-0.90	1.24	0.13	0.00	0.10	0.12	3.71	-0.01
India										
1970-1990	4.74	-0.04	0.29	0.89	0.28	-0.04	-0.19	-0.08	3.63	0.000
1991-2011	5.08	-0.04	0.08	1.10	0.35	-0.20	0.17	-0.01	3.63	0.009
Indonesia										
1970-1990	4.87	0.33	-0.21	0.97	0.32	-0.02	0.03	0.00	3.46	0.003
1991-2011	5.15	0.34	-0.21	1.20	0.41	0.00	-0.05	0.00	3.46	-0.01
Iran										
1970-1990	4.69	0.36	0.40	0.92	0.44	0.22	-0.15	0.01	2.48	-0.01
1991-2011	4.84	0.37	-0.05	1.14	0.56	0.59	-0.25	0.00	2.48	0.004
Iraq										
1970-1990	4.86	0.56	-0.03	1.11	0.04	-0.01	0.04	-0.03	3.15	0.021
1991-2011	5.00	0.58	-0.01	1.38	0.05	-0.19	0.07	-0.02	3.15	-0.01
Israel										
1970-1990	4.84	1.21	-2.22	0.83	0.10	0.00	0.29	0.35	4.29	-0.01
1991-2011	5.14	1.29	-2.22	1.02	0.13	0.00	0.46	0.17	4.29	0.002
Italy										
1970-1990	4.90	1.64	0.11	0.99	-0.08	0.00	Na	check	2.25	-0.01
1991-2011	5.25	1.76	0.11	1.23	-0.10	0.00	Na		2.25	0.00
Mexico										
1970-1990	4.82	0.88	0.28	1.02	0.36	0.00	-0.26	-0.01	2.57	-0.01
1991-2011	5.15	0.94	0.34	1.26	0.45	0.00	-0.43	-0.01	2.57	-0.02
Morocco										
1970-1990	4.77	0.42	-0.87	1.20	0.05	0.00	0.01	-0.02	3.96	0.00
1991-2011	5.10	0.45	-0.81	1.49	0.07	0.00	-0.05	-0.01	3.96	-0.01
Nigeria										
1970-1990	4.84	0.99	0.34	0.87	0.24	0.04	0.04	-0.07	2.34	0.03
1991-2011	5.07	1.04	0.40	1.08	0.31	0.01	0.04	-0.06	2.34	0.03
Pakistan										
1970-1990	4.83	-0.25	0.50	1.17	0.30	0.02	0.06	-0.07	3.08	0.02
1991-2011	5.03	-0.27	0.47	1.45	0.38	0.03	0.05	-0.06	3.08	0.03
Peru										
1970-1990	4.84	0.33	-0.78	1.03	0.10	0.00	0.04	0.16	3.97	-0.01
1991-2011	5.12	0.35	-0.78	1.28	0.12	0.00	0.08	0.16	3.97	0.004
Philippines										
1970-1990	4.90	1.16	-0.33	0.98	0.23	0.00	0.00	-0.08	2.93	0.008
1991-2011	5.15	1.22	-0.34	1.21	0.29	0.00	-0.09	-0.08	2.93	0.000

Table 5  
(contin)

<u>Year</u>	<u>Ln(P)</u>	<u>Prsist</u>	<u>Scle</u>	<u>Class</u> <u>Price</u>	<u>Oil</u>	<u>Dum</u>	<u>Quality</u>	<u>OP4</u>	<u>Fixed</u>	<u>Error</u>
1970-1990	4.70	0.60	-0.05	0.82	0.43	-0.08	0.01	0.01	2.95	0.014
1991-2011	5.01	0.64	-0.08	1.02	0.54	-0.04	0.01	0.01	2.95	0.004
Taiwan										
1970-1990	4.92	0.87	-2.27	1.07	0.00	0.00	0.07	0.04	5.14	0.005
1991-2011	5.28	0.94	-2.32	1.33	0.00	0.00	0.16	0.04	5.14	0.008
Thailand										
1970-1990	4.94	1.47	-0.32	0.89	0.15	0.00	0.00	-0.02	2.78	-0.01
1991-2011	5.24	1.56	-0.36	1.11	0.19	0.00	-0.02	-0.02	2.78	-0.01
Ussr/Former										
1970-1990	4.81	-0.73	0.14	0.53	1.01	-0.01	-0.55	-0.18	4.62	-0.01
1991-2011	5.01	-0.74	0.11	0.65	1.27	-0.02	-0.56	-0.18	4.62	-0.02
Venezuela										
1970-1990	4.97	0.98	-1.30	1.03	0.26	0.00	-0.14	0.11	4.01	0.011
1991-2011	5.18	1.03	-1.30	1.27	0.33	0.00	-0.21	0.11	4.01	0.014
All other										
1970-1990	4.91	1.05	-1.13	1.07	0.00	-0.01	0.00	0.01	3.92	0.008
1991-2011	5.18	1.11	-1.16	1.32	0.00	0.00	0.00	0.01	3.92	0.009
Netherlands										
1970-1990	4.87	-1.12	0.38	1.48	0.31		Dargp 0.01	Daup -0.03	3.87	-0.03
1991-2011	5.15	-1.19	0.22	1.84	0.39		0.00	-0.03	3.87	-0.02

1/ Explanatory footnotes are listed on the first table page.

2/ The terms Dargp and Daup represent the difference in the prices of two competing exporters. Since Netherlands is a trans-shipment country, the U.S. import share is not a good variable to measure competition in that market.

**Table 6: Model Difference Class Wheat Versus a Generic Wheat**

	Wholesale Price Effect	Due to Transmission Coefficient	Due to Price Differences	Quantity Effect
Algeria	0.407	0.533	-0.126	-1.838
Bangladesh	-0.036	-0.044	0.008	0.124
Brazil	0.539	0.583	-0.044	0.115
China	0.319	0.234	0.085	0.120
Chile	0.536	0.439	0.097	0.122
Columbia	0.573	0.601	-0.029	-0.397
Dominican Repubic	-0.091	-0.062	-0.029	-0.848
Korea	0.018	0.007	0.018	-0.455
Japan	-0.078	-0.045	-0.033	-2.226
Egypt	0.110	-0.002	0.112	0.057
Guatemala	0.500	0.528	-0.028	-0.808
India	0.156	0.148	0.008	-0.036
Indonesia	-0.018	-0.028	0.010	-0.322
Iran	0.746	0.772	-0.026	0.010
Iraq	0.754	0.778	-0.024	-0.015
Israel	0.202	0.234	-0.032	-3.149
Italy	0.566	0.604	-0.039	-0.073
Mexico	0.667	0.688	-0.022	0.285
Morocco	0.617	0.646	-0.030	-0.347
Nigeria	0.516	0.536	-0.021	-0.067
Pakistan	-0.065	-0.078	0.013	0.094
Peru	0.448	0.480	-0.033	-0.106
Philippines	-0.061	-0.030	-0.031	-0.798
Sri Lanka	-0.055	-0.062	0.006	0.053
Thailand	0.556	0.585	-0.029	-0.280
Taiwan	0.472	0.496	-0.024	-0.247
Ussr	0.151	0.175	-0.024	-0.044
Venezuela	0.629	0.654	-0.025	-0.310

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1/ Column 1(4) summarize the difference in the whole-sale price (quantity) effect between a generic model and class specific model. Columns 2 and 3 decompose this difference.

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