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Institutions and Price Transmission in the Vietnamese Hog Market

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Abstract: This article addresses the issue of whether different market institutions are accompanied by different degrees of efficiency and symmetry of price transmission between the producer and retail levels. It analyzes hog market institutions as they differ between the North and the South regions of Vietnam. The paper uses a price asymmetry model including an error correction term to reconcile potential cointegration relations with symmetry. The analysis shows that the market is efficient in conveying accurate information, provided public support institutions are in place.

Introduction

Several recent studies have analyzed the integration of agri-food markets to determine whether marketing channels convey supply and demand shocks efficiently, and thus provide the right incentives to producers (Fackler and Goodwin, forthcoming; Sarker, 1995). The literature on traditional industrial organization has looked at whether institutional factors play a role in determining price. However, in Vietnam, there has been no data assembled to analyze either market integration or market institutions. This paper contributes to the empirical literature by linking price and institutional analyses focused on the hog market in Vietnam. We analyze a time series of price data to evaluate the efficiency of the transmission of supply and demand information in the marketing channel. The context is postliberalization—characterized by poor contract enforcement mech-

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anisms, imperfect market for credit, and unclear property rights (Fforde and de Vylder, 1996).

Previous research in the field identified the institutional structure of hog transactions taking place between producer and consumer levels in the North and South of Vietnam (Le Goulven, 2000). The objective of this article is to evaluate the degree of price transmission along the marketing channel in both regions. When supply shocks are not efficiently conveyed to consumers, market intermediaries are benefiting from market imperfections and are reducing market transparency. That hurts consumers' welfare and producers' incentives to increase their production. We show that the market is efficient at conveying accurate information, provided public and formal support institutions are present.

Background

Market Structure

In Vietnam, agriculture represents one-third of the GDP and employs 73% of the economically active population. The livestock sector is a key sector to "accelerate agricultural growth, contribute to the development of those regions where most of the poor live, and exploit the potential for high-valued exports" (Goletti and Rich, 1998).

The hog market is still mainly backyard, small-scale production—80% of the households are fattening one to two hogs per year (Le Ba Lich, 1996). Hog production is a form of precautionary savings and often the only way for peasants to get cash income (Le Goulven, 2000). Yet many small units add up—the sector has an annual growth of 3.8%, and hog production generated 71% of the animal husbandry gross output in 1995 (General Statistical Office, 1996).

Because of the liberalization of the Vietnamese economy in the early 1990s and as a result of rising average income, pork consumption increased from 8.5 kg/capita/year in 1992 (General Statistical Office, 1994) to 10.1 kg in 1996 (Le Goulven, 2000). Yet that figure is still low compared to neighboring Asian countries where it stands around 30 kg/capita/year. However, the demand in the countryside remains oriented toward fat pork, whereas the trend is for lean meat in big cities such as Ha Noi in the North or Ho Chi Minh City in the South. On average, pork consumption per capita per year is 77% higher in those two main cities than in the countryside. Our analysis focuses on the supply of pork to Ha Noi and Ho Chi Minh City, the two major cities. The growing demand in these cities should be stimulating production via market signals. If the market allows such information to be transmitted efficiently via prices, then producers can take advantage of the opportunities to increase their production, thereby diversifying their farm income away from rice and thus the fluctuations of the international rice market.[1]

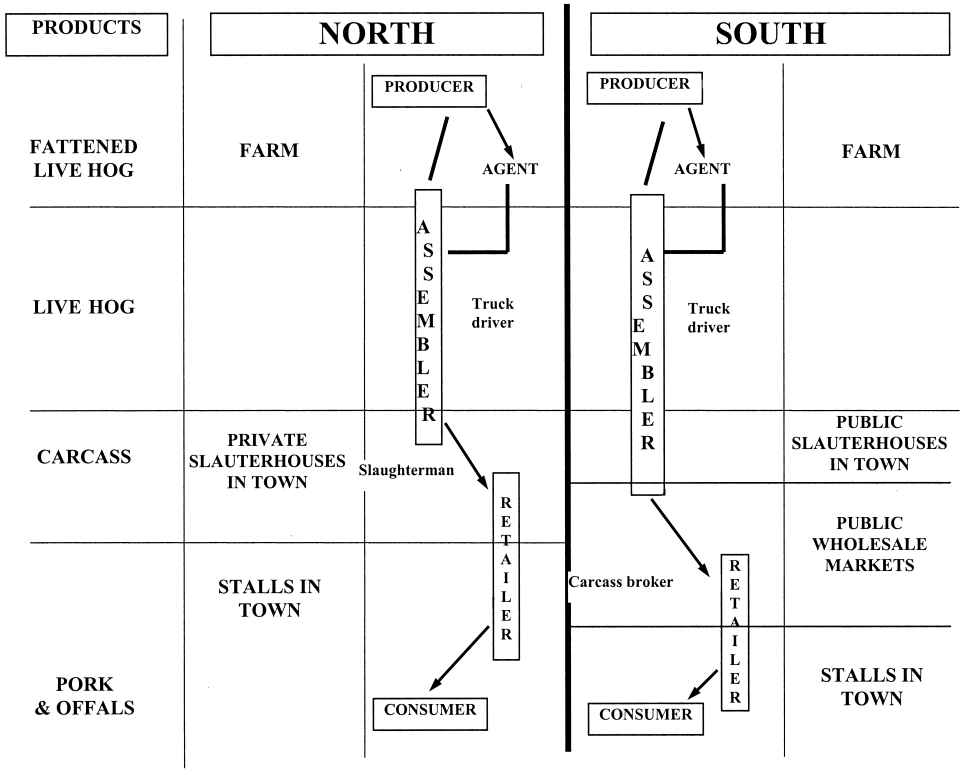

Figure 1. Organization of the hog marketing channel in Vietnam.

The structure of the present hog market can be characterized by two essential transactions between the producer and consumer levels (Figure 1): the transaction of live hogs between producers and assemblers (T_1), and the transaction of pork carcasses between assemblers and meat retailers (T_2). In T_1, assemblers buy hogs from producers widely dispersed in the countryside, and in T_2 they have to find buyers who are scattered in the city open markets. As a consequence of high transaction costs, assemblers resort to agents' services: upward to extend their procurement area, and downward to kill the animals and sell the carcasses to meat retailers. Since there is no refrigeration chain, hogs are transported live and then slaughtered the same day, close to the place where pork is sold and consumed. No meat processing plant (with a slaughtering line) is supplying the domestic market with carcasses. Slaughterhouses are instead very basic setups where animals are killed and dressed manually.

In the North, slaughterhouses are privately owned. Urban agents are slaughterers in charge of killing the hogs and selling the carcasses to meat retailers. In the South, slaughterhouses are publicly operated. Urban agents are brokers only, in charge of selling carcasses on wholesale markets. Both types of agents are hired

by the assemblers and paid a fixed price per kilo of carcasses sold according to the services they provide.

Institutional Structure

The institutional analysis of the market uses data collected in a survey of 300 assemblers and other actors in the marketing chain in nine provinces throughout the country. The analysis reveals that institutions governing hog transactions are different in the North and the South. The results presented in detail in a previous paper (Le Goulven, 2000) show that along the hog marketing chain, in Vietnam as in other countries, there is strong uncertainty as to the quality of the products, as well as the production cycle patterns and market conditions.

In T_1, assemblers have to cope with uncertainties that concern hog yields (ratio carcass weight/live weight), health (sanitary aspects), and fat content (percentage of meat), since they are buying live animals and selling carcasses. These uncertainties can lead to opportunistic behavior by producers trying to feed the hogs before the transaction, or to hide the real state of health of the hogs from buyers.

On the one hand, this risk can be partly reduced if one is able to evaluate the quality of the carcass from a live hog. Such an estimation results from specific knowledge each buyer can acquire by being taught or by learning-by-doing. This knowledge is gained individually even if common criteria can usually be used.

On the other hand, specific contracts can be adopted as institutional mechanisms to regulate the exchanges and reduce the risk of ex-ante opportunism. The results from the survey reveal that actors coordinate through oral contracts that are identified as relational contracts (Macneil, 1974), where the identity of the parties and the social milieu within which the contract is consummated are relevant. The terms of the contracts are such that information costs and actors' risks are reduced. The survey also showed that oral contracts in T_1 are enforced by mutual trust built between the two parties in repeated transactions. This trust is exchanged in the same way as the product. If party A cheats at t_n (the producer does not tell the collector that his hog is sick), party B will either cheat at t_{n+1} (the collector gives a price which is not the real price of the market), or break the contract as a result of loss of trust in the partner (the collector will never again buy hogs from this producer). The social content of personal relations "carries strong expectations of confidence that the other will abstain from opportunism" (Granovetter, 1985).

In T_2, uncertainties about the quality of the meat and the market conditions still generate high transaction costs due mainly to the risk of perishability of the hogs brought to town, and of the carcasses given a lack of refrigerating systems or urban stockyards. To reduce these costs, assemblers resort to the services of urban agents (slaughterers in the North, brokers in the South) that work with meat retailers and provide a daily regularity in the selling of carcasses. Surveys reveal

that bilateral arrangements between assemblers and their agents are relational contracts enforced by mutual trust built between parties in repeated transactions.

The most important finding of the institutional analysis is that while mutual trust is sufficient to enforce T_1 and T_2 contracts in the South, it must be accompanied by other means of enforcement in the North. There exist some hog merchant networks composed of assemblers and their rural agents, who operate in a geographic area corresponding to one or two districts. The merchant networks, similar to the medieval Maghribi coalitions described by Greif (1993), are fulfilling several functions in the North: (1) joint problem-solving arrangements and solidarity between members that are effective for transport, for buying and selling negotiations, and for informal relations with the police; (2) extension of the areas of collection and the market by using the services of rural agents; (3) guarantee of the quality of hogs going to urban areas by the sorting done by merchants; (4) reduction in potential opportunistic behavior within the network. The agency relations between assemblers and agents are enforced by the credible threat of collective punishment, since information on past cheating behavior is common knowledge of the network members; and (5) reduction of potential opportunistic behavior outside the network. The agency relations between assemblers and slaughterers are also enforced by the coalition. Nevertheless, the enforcement power is limited to the area of the network. As slaughterers are supplied by assemblers from several provinces, the threat of boycott by a network from a district of a specific province is hardly credible.

The existence of the these networks not only favors mutual aid and sanctions based on multilateral reputation (Milgrom, North, and Weingast, 1985), but they also support the definition of collective rules for fixing prices. The survey data show that, within a network, merchants define daily a common price for the purchase of hogs, and that they respect this common price when they buy individually. The data also show that some merchants can be excluded from the network if they consistently do not respect the common price.

Moreover, in the North, one assembler contracts with only one slaughterer—but a slaughterer is the agent of assemblers from several regions. In addition to being the agent of assemblers to kill the hogs and to sell the carcasses, a slaughterer is providing services that maintain assemblers in a state of dependency: (1) long-term credit is often offered by slaughterers to assemblers who also provide them with private protection services against theft and police abuses (illegal tax collection); (2) to facilitate the transport of hogs by assemblers, slaughterers often register trucks owned by collectors in their names. Thus, there is an important specific investment from slaughterers to assemblers that justifies the exclusive contracts system.

In the South of the country, brokers only sell carcasses. They do not provide other services to assemblers, nor to retailers. Credit is provided by specific actors,

mainly Chinese families from the Cho Lon district of Ho Chi Minh City. Therefore, products and credit markets are clearly segmented.

The institutional analysis of the hog market reveals two different organizations. On the one hand, in the North, market institutions are private: private trader networks reduce information costs and attenuate potential opportunism in rural areas, and private actors provide services traditionally considered as public (credit, slaughter) in the urban areas. On the other hand, in the South, market institutions are mainly public: slaughterhouses are all ruled by local government authorities that provide public services, and carcasses are sold in wholesale auction markets.

These findings suggest a paradox: considering that Vietnamese collectivization has been stronger and existed longer in the North—1954 to 1986—than in the South—1975 to 1986, one would expect more public goods to be provided in the North. The explanation lies in the cultural traits and historical heritage of both regions that have shaped different types of societies and thus differences in market embeddedness.

The cultural traits of the Vietnamese population are based on the association of Confucianism and Buddhism. The former put the family and the lineage at the center of social relations, whereas the latter supports a more contemplative and individualistic attitude. Previous research showed how the natural resource endowments of the North and the South of Vietnam, as well as the history of both regions, have contributed to the expression of the collective and the individualistic side of the culture, respectively (Le Goulven, 2000).

The natural conditions in the North have contributed to the development of collective institutions to socialize individual risks: mutual aid for irrigation works and collective storage of grain, and insurance systems for natural catastrophes have been major institutions in the social organization of Northern villages. Moreover, the North has been subject to very high demographic pressure, and to several and recurrent conflicts with invaders. The rural collective was therefore also organized for military defense.

In the South, the abundance of land, the low demographic pressure, and the distribution of the population along canals and roads have defined a different social system, where the population is more oriented toward the outside and less suspicious of foreign people. During the communist period, those differences were maintained if not accentuated. The collectivization of agriculture and the definition of the agricultural cooperative at the commune level confirm the isolation of traditional rural institutions independent from central government. The South has been reluctant to collectivize and to submit to communist control. Therefore, after the Renovation, the Southerners were more receptive to the market economy that they had in any case experienced during the American occupation. The functioning of the Northern system could be compared to a collectivist system when contract enforcement is mainly based on the reputation

and trust that actors are building. Segregation exists in such a system, as actors will preferentially interact with people from the same commune, group, or family. The social functioning of the South is closer to the individualistic system characterized by the importance of bilateral reputation.

The differences in market structures and institutions may lead to differences in price formation along the marketing chain, and therefore to differences in the efficiency of market signal transmission between producers and consumers. Intermediaries in the marketing chain may exert some power in price formation so that production (consumption) price increases (decreases) are passed on to consumers (producers) more rapidly and perhaps more completely than production (consumption) price decreases (increases). The market is then said to be asymmetric and intermediaries are in a position to capture rents. We test this hypothesis by evaluating the impact of alternative institutions—private and informal in the North and public and formal in the South, as to their efficiency of price transmission along the hog marketing chain.

Method

The question of whether there is symmetric response to price changes in markets is not new in the agricultural economics literature. Most studies have focused on vertical price relationships in the commodity marketing channels of developed countries. Boyd and Brorsen (1996) found no evidence of asymmetry in the U.S. pork marketing channel. Punyawadee et al. (1991) report limited short-run asymmetry between pork markets in Ontario and Alberta. von Cramon–Taubadel (1998) demonstrates that transmission between producer and wholesale pork prices in northern Germany is asymmetric. Few of this sort of study have been conducted in developing countries where access to price information is difficult.

To address the question of price transmission, Wolffram (1971) and Houck (1997) developed a method based on a simple price asymmetry model:

$$\sum_{t=1}^{\tau} \Delta P_{r,t} = \beta_0 + \beta^{+} \sum_{t=1}^{\tau} \Delta P_{p,t}^{+} + \beta^{-} \sum_{t=1}^{\tau} \Delta P_{p,t}^{-} + \varepsilon_{\tau} \qquad (1)$$

where $\Delta P_{r,t}$, $\Delta P^{+}{}_{p,t}$ and $\Delta P^{+}{}_{p,t}$ are the price changes for retail pork in the urban area, the positive price changes for live hogs in the rural area, and the negative price changes for live hogs in the rural area at time t respectively, $\beta_{0,}$ β^{*}, and β^{-} are coefficients, τ is the current time period and ϵ_t the error term. Asymmetry is tested by determining whether $\beta^{+} = \beta^{-}$. Boyd and Brorsen (1988) modified (1) and made it dynamic using lagged prices to test for both price asymmetry and the speed of price adjustment. If we call $PR_{t,}$ PPP_{t}, and $NPP_{t,}$ the values of $\Sigma\Delta P_{r,t,}$

$\Sigma\Delta P^{+}_{p,t}$, and $\Sigma\Delta P^{-}_{p,t}$, respectively, and if we add m lags in (1), we obtain the following specification:

$$PR_t = \beta_0 + \sum_{m=0}^{k} \mathrm{B}_m^{+} PPP_{t-m} + \sum_{m=0}^{k} \beta_m^{-} NPP_{t-m} + \varepsilon_t \qquad (2)$$

PR_t stands for the retail price change in the urban area. PPP_t and NPP_t are the variables denoting the rising and falling phases of live hog farm gate prices respectively and are computed via the Houck procedure. Following Bailey and Brorsen (1989), two asymmetry hypotheses can be tested in (2). The first null hypothesis is that the aggregate impact of live hog price increases and decreases on pork retail price are equal:

$$H_0: \sum_{m=0}^{k} \beta_m^{+} = \sum_{m=0}^{k} \beta_m^{-}$$

The second null hypothesis is that the speed of adjustment is the same for both price increases and decreases:

$$H_0: \beta_0^{+} = \beta_0^{-}, \beta_1^{+} = \beta_1^{-} \ldots, \beta_m^{+} = \beta_m^{-}$$

Rejecting the first hypothesis implies that the two price series would tend to drift apart over time as a result of imperfect information, time lags in information flow, market power, or constraints to arbitrage (Punyawadee, 1991). Rejecting the second hypothesis indicates that the rate of adjustment differs for positive and negative price changes, that is, price asymmetry.

When (2) is estimated without regard to the time series nature of the data used, spurious correlations can arise if $P_{r,t}$ and $P_{p,t}$ are nonstationary. Nevertheless, the two variables can be cointegrated, meaning that $P_{r,t} = \alpha_0 + \alpha_1 P_{p,t} + u_t$ with u_t being stationary (Engle and Granger, 1987). If so, Granger and Lee (1989) propose a modification to (2) that makes it possible to test for asymmetry between nonstationary but cointegrated variables:

$$\Delta P_{r,t} = \beta_0 + \beta_1 \Delta P_{t-1} + \beta_2^{+} ECT_{t-1}^{+} + \beta_2^{-} ECT_{t-1}^{-} + \beta_3(L)\Delta P_{r,t-1} + \beta_4(L)\Delta P_{p,t-1} + \varepsilon_t \qquad (3)$$

where ECT is the error correction term such as $ECT = ECT^{+} + ECT^{-}$ and $ECT_{t-1} = u_{t-1} = P_{r,t-1} - \alpha_0 - \alpha_1 P_{p,t-1}$, and $\beta_3(L)$ and $\beta_4(L)$ are lagged polynomials. In (3), the null hypothesis of symmetry therefore becomes:

$$H_0\colon \beta_2^+ = \beta_2^-.$$

The inclusion of the error correction term in (3) reconciles potential cointegration relations with symmetry analysis. However, von Cramon–Taubadel (1998) points out that simultaneity between P_r and P_p and data frequency can influence attempts to measure asymmetry, and notes that weekly data are sufficient for price transmission analysis in European pork markets. To avoid inconsistent estimation because of potential simultaneity between prices, he also suggests testing for weak exogeneity of the variables in the model. The method used is the one introduced by Boswijk and Urbain (1997) where the error correction representation in (3) is completed by a marginal model for P_p:

$$\Delta P_{p,t} = \gamma_0 + \gamma_1(L)\Delta P_{r,t1} + \gamma_2(L)\Delta P_{p,t-1} + \nu_t \tag{4}$$

The weak exogenity of P_p with respect to the short run parameter is tested by a variable addition test of the error correction term ECT_{t-1} in (4).

Data and Results

Data used in the study include weekly prices of live hog and pork from ten provinces in Vietnam. The data were collected by the Vietnamese Institute for Markets and Prices from January 1993 to June 1998 (264 observations). Producer prices in the North are represented by average live hog prices in the provinces of Vinh Phu, Ha Tay, Nam Dinh, and Nghe, which are the areas supplying Ha Noi regularly. Retail prices in the North are the average prices of ham in Ha Noi markets. Producer prices in the South are represented by average live hog prices in the provinces of Dong Nai, Quang Ngai, Tieng Giang, and Vinh Long, which are Ho Chi Minh City's major suppliers. Retail prices in the South are the average prices of ham in Ho Chi Minh City markets.

All data are deflated using the Consumer Price Index provided by the Department of Trade and Price Statistics in Ha Noi. Using the Augmented Dickey Fuller (ADF) test (Dickey and Fuller, 1979), we fail to reject the null hypothesis of nonstationarity for each time series (Table 1). P_p and P_r in both regions may, therefore, be cointegrated. The Johansen (1988, 1990) procedure is then used to test for cointegration between P_p and P_r in both regions. Results from the tests are presented in Table 2 and show that P_p and P_r are not cointegrated in the North but are cointegrated in the South. Therefore, to analyze vertical price transmission and asymmetry in the hog marketing chain in Vietnam, we use model (2) for the North and models (3) and (4) for the South.

Table 1. Results of the Augmented Dickey Fuller test for P_p et P_r in the North and in the South

			Critical Values of the Test		
Variables	*t-stat (ϕ)*	*Lags*	*1%*	*5%*	*10%*
P_p North	−1.50	4	−3.457	−2.872	−2.572
P_r North	−1.63	6	−3.457	−2.872	−2.572
P_p South	−2.24	5	−3.457	−2.872	−2.572
P_r South	−2.25	5	−3.457	−2.872	−2.572

Note: The number of lags is chosen according to information criteria (Akaike and Schwarz) so that there is no autocorrelation in the residuals.

Price Transmission and Symmetry in the North

As P_p and P_r are not cointegrated, we first test for Granger (1969) causality to determine which price series is the dependent variable to be used in (2) (Monhanty, Peterson, Kruse, 1995). The series to be included in the test of Granger causality have to be stationary. However, Sims et al. (1990) demonstrate that causality tests can be conducted on series which are not stationary in levels but are stationary in differences, by estimating a vector auto-regressive representation of the first-differenced series. The results of the ADF test conducted on the first differences of P_p and P_r are presented in Table 3 and show that the null hypothesis of stationarity is rejected for both series at one percentage significance. The results of the test for causality[2] show that in the North, ΔP_p causes ΔP_r. ΔP_r thus becomes the dependent variable in (2). The variables are then segmented following the Houck procedure (Table 5).

Model (2) is estimated using the least-squares method (Monhanty, Peterson, and Kruse, 1995). Lags are included in the model until there are no more significant effects (Kinnucan and Forker, 1987). After two lags, there is no more significant effect between the two variables. It implies that price adjustments at the retail level are occurring from one to two weeks after a shock emerging at the production level.

Focusing on Table 6, note first that the R^2 is 0.96, which means that nearly all the fluctuations of the retail prices of pork in Ha Noi are explained by fluctuations in the live hog production price in rural areas supplying the city. Second, the

Table 2. Test for Cointegration between P_p et P_r using Johansen Method

			H_0			
	Trace Statistic	*Trace (0.90)*	*Trace (0.95)*	λ_{max}*Statistic*	λ_{max} *(0.90)*	λ_{max} *(0.95)*
North						
$r = 0$	15.62	17.79	19.00	13.56	13.75	15.67
$r = 1$	2.05	7.50	9.138	7.52	9.24	9.24
South						
$r = 0$	43.86**	17.79	19.00	39.95**	13.75	15.67
$r = 1$	3.88	7.50	9.138	3.88	9.24	9.24

Note: ** = significant at 5%.

Table 3. Results of the Augmented Dickey Fuller test for ΔP_p and ΔP_r in the North

			Critical Values of the Test		
Variables	*t-stat (ϕ)*	*Lags*	*1%*	*5%*	*10%*
ΔP_p	−7.06**	5	−3.457	−2.872	−2.572
ΔP_r	−16.93**	0	−3.457	−2.872	−2.572

Note: ** = significant at 1%.

coefficient for changes in the current price in Ha Noi is larger than one. Therefore, retail prices react to an extent beyond the shocks occurring at the production level. It seems that adjustments occur within the week, and data of a higher frequency would be necessary to examine the process of price transmission more precisely. And third the significance of the coefficients differs for increases and decreases in production prices. Only contemporaneous coefficients for increases in production price (PPP_t) are significant, whereas coefficients for decreases of production price are significant for both contemporaneous (NPP_t) and lagged prices (NPP_{t-1}, NPP_{t-2}). This suggests that retail prices react more rapidly when the margin is squeezed than when it is stretched. Those results are corroborated by the test of the two-asymmetry hypothesis. The $F\sim$test of the first hypothesis indicates that the total impacts of production price increases and decreases on retail price changes are different. The F statistics of the second hypothesis indicate that the retail price response to price increases differs from that of price decreases at the production level. Empirical results therefore demonstrate that price transmission between the production and the retail levels of the hog market in the North of Vietnam are asymmetric.

Price Transmission and Symmetry in the South

Equation (3) is first estimated with P_r as the dependent variable[3], with six lagged differences for both P_p and P_r and then reduced to the most parsimonious model corrected for both auto-correlation and partial auto-correlation of the residuals. Results of the estimation are presented in Table 7. Following Boswijk and Urbain (1997), we test for weak exogeneity with respect to the long-run parameter by adding the estimated segmented error correction term to (4). Results in Table 8 show that we fail to reject the null hypothesis of weak exogeneity with respect to the long-run parameters for the producer price. Then a variable addition is used to test the significance of $\hat{\nu}_t$, the residuals from the marginal model (4), in

Table 4. Results of the Granger causality test between ΔP_p and ΔP_r

H_0	*F-stat*	*Pr*
ΔP_p does not cause ΔP_r	4.21053	0.00257
ΔP_r does not cause ΔP_p	1.08237	0.36574

Table 5. Segmentation of the Independent Variable According to the Houck Procedure

$P_{r,t}$	$PR_t\ P_{r,t} - P_{r,0}$	$P_{p,t}$	$\Delta P_{p,t}$	$PPP_t\ \Sigma\Delta P^{+}_{p,t}$	$NPP_t\ \Sigma\Delta P^{-}_{p,t}$
13000	0	6875	—	—	—
12890	−110	6693	−182	0	−182
12289	−711	6636	−57	0	−239
13159	159	6604	−32	0	−271
13047	47	6524	−80	0	−351
13054	54	6551	27	27	−351
13060	60	6748	197	224	−351
13066	66	6751	3	227	−351
12588	−412	6742	−9	227	−360
12582	−418	6787	45	272	−360

the structural model (3). The results in Table 7 indicate that $\hat{\nu}_t$ is not significant in the equation, that is, we fail to reject the null hypothesis that producer prices are weakly exogenous with respect to the short-run parameters in (3). Both tests confirm our choice of estimating (3) with P_r as a dependent variable.

Returning to Table 7, note that the positive error correction term (ECT^{+}_{t-1}) is significant at the 1% level in the equation, whereas the negative error correction term (ECT^{-}_{t-1}) is only significant at the 10% level. The difference in the value of the associated coefficients suggests that increases in producer prices are transmitted more efficiently to retail prices than are producer price decreases. However, we fail to reject the null hypothesis of symmetry, ($\beta_2^{+} = \beta_2^{-}$), using an $F\sim$test (1,3638; Pr = 0,2429). Empirical results support the hypothesis that retail prices in Ho Chi Minh City react in a symmetric way to changes in producer prices in the supplying provinces.

Table 6. Estimation of the Model (2) of Transmission Asymmetry between P_p and P_r in the North (dependent variable = PR_t)

Independent variables	*Model (2)*	
constant	1054,55**	
NPP_t	0,4962	
NPP_{t-1}	1,0265**	
NPP_{t-2}	0,5942**	
PPP_t	1,9032**	
PPP_{t-1}	0,0435	
PPP_{t-2}	0,3029	
R^2	0,9646	
H_0:	F-stat	Pr
$\sum_{m=0}^{k} \beta_m^{+} = \sum_{m=0}^{k} \beta_m^{-}$	25,6726	0.0000
$\beta_0^{+} = \beta_0^{-},\ \beta_1^{+} = \beta_1^{-} \ldots,\ \beta_m^{+} = \beta_m^{+}$	11,6875	0.0000

Note: * = significant at 5%, ** = significant at 1%.

Table 7. Estimations of the Error Correction Structural Model (3) (dependent variable: $\Delta P_{r,t}$)

Independent variables	*Model (3):*
constant	38,7847
$\Delta P_{p,t}$	0,6769**
ECT^{+}_{t-1}	−0,3161**
ECT^{-}_{t-1}	−0,1405
$\Delta P_{r,t-1}$	−0,1064
$\Delta P_{r,t-3}$	−0,0940
$\Delta P_{r,t-2}$	0,2830*
R^2	0,241
ϕ	−0,4727

Notes: * = significant at 5%, ** significant at 1%.
ϕ = variable addition test for the residuals of the marginal model (4) (test of weak exogeneity of P_p with respect to the short-run parameters).

Discussion

In the North, the diversity of supply regions to the slaughterers enhances competition. But competition is limited by the rigidity of the supply contracts maintained by networks of merchants for the slaughterers to have their specific investments reimbursed, thereby reducing arbitrage for assemblers. The merchant networks, using exclusive supply contracts, allow traders to influence the transmission of price shocks and are therefore explanatory variables for the asymmetrical price transmission along the marketing channel in the North.

In the South, the collective formal institutions, that is, the People's Committee and the wholesale markets they have created, have an indirect effect that stimulates large-scale competition. The concentration of the selling of the carcasses in wholesale markets favors the competition among the assemblers of all the supplying areas and thus among different provinces in the rural supplying

Table 8. Estimations of the Marginal Model (4) for P_p (dependent variable: $\Delta P_{p,t}$)

Independent variables	*Model (4):*
constant	−0,5903
$\Delta P_{p,t-1}$	0,0781
$\Delta P_{r,t-1}$	0,0652*
$\Delta P_{r,t-5}$	0,0864**
R^2	0,080
$\phi_{ECT^{+}\ et\ ECT^{+}}$	−0,0365

Notes: * = significant at 5%, ** significant at 1%.
ϕ = variable addition test for the residuals of the marginal model (4) (test of weak exogeneity of P_p with respect to the long-run parameters).

areas. Public institutions that enhance competition among traders and reduce collusive behavior thus condition the symmetrical and fluid price shocks transmission in the Southern marketing channel.

CONCLUSION

The empirical analysis supports a point raised in the institutional analysis: the difference in the institutional structure of the hog market in Vietnam may have an impact on its efficiency. In the North, where market institutions are private, producer prices and retail prices do not exhibit a common long-run equilibrium. Moreover, price transmission between the producer and the retail levels is asymmetric. The margin of market intermediaries is corrected more rapidly when it is squeezed than when it is stretched. In the South, where market institutions are public, producer prices and retail prices are cointegrated—linked by a common long-run equilibrium toward which they both converge. Even though changes in producer prices are not transmitted within one week to retail prices, price transmission is symmetric. As a consequence, hog and pork prices in the South allow for supply shocks (climatic shocks, floods, disease) to be transmitted more efficiently along the marketing channel, thus contributing to the development of hog production according to market signals. These findings suggest that there exist more incentives for producers to develop and diversify their production, and to reduce rural poverty where public institutions and local governments structure markets in Vietnam. Moreover, it is highlighted that market competition is more effective where public rather than private support institutions exist. To favor competition in transition countries, government policy options should consider enabling conditions for private competition as a means of improving competitive conditions rather than expect privatization alone to succeed providing the right economic incentives.

Showing that “institutions matter” is no novelty as donors have acknowledged it since the Asian Miracle, and praised it in the ensuing Annual Conferences on Development Economics. In the broad “ institutions matter ” frame of mind, one might be tempted to transfer the Southern institutional structure of the hog market to the North. But it would overlook differences in market embeddedness in both locations. Following national directives, the Ha Noi People’s Committee also aims at centralizing slaughter to better switch to public plants. Forums are also organized with traders in an attempt to create wholesale markets in the capital. However, our survey shows that in Ha Noi, traders have no personal incentive to work together. In a tradition where disputes are solved in a family or community context, they do not trust the intervention of a local administration that hardly has power to enforce new rules. Market efficiency is not only a result of market

structure but also of market social embeddedness and history that determine the nature of the institutions governing transactions.

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NOTES

1. Vietnam. is today the second world exporter of rice. The falling of the price of rice in the international market in 1997 has affected Vietnamese rural incomes tremendously, creating a loss of 400 million US dollars, according to the estimations done by Barbé.
2. To test for causality four regressions are necessary (1) ΔP_p on its own lagged values $\Delta P_p^{m,}$ (2) ΔP_p on its own lagged values ΔP_p^{m} and the lagged values $\Delta P_r^{m,}$ (3) ΔP_r on its own lagged values $\Delta P_r^{m,}$ and (4) ΔP_r on its own lagged values ΔP_r^{m} and on the lagged values $\Delta P_p^{m.}$ Then we test whether the coefficients for the lagged values of ΔP_r^{m} in (2) and for the lagged values of ΔP_p^{m} in (4) are null. The respective null hypothesis are that ΔP_r does not cause ΔP_p and ΔP_p does not cause $\Delta P_{r.}$ Results in Table 4 give the F statistics for each of the null hypothesis.
3. Using the Johansen procedure, the null hypothesis that the factor loading for P_p in the cointegration equation equals zero is not rejected. This implies that P_p is weakly exogenous with respect to the parameters of the long-run stationary relation linking the two prices. Thus (3) is estimated with P_r as the dependent variable.

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