



Determinants of Participation in Contract Farming in Pig Production in Northern Viet Nam

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SUMMARY

The rapid growth in demand for pork in Viet Nam presents an opportunity for rural households raising pigs to improve their incomes. This market potential could be exploited to improve incomes of rural smallholders through institutional arrangements that provide improved access to livestock markets and services, through formal and informal contract arrangements. Contract arrangements, however, have explicit and implicit barriers to entry that tend to exclude smallholders, depending on the nature of the contracts.

Based on data from a field survey conducted in four provinces in Northern Viet Nam in 2005-06, comprising a sample of 400 pig raising households (200 independent producers, 166 farmers with informal contracts, and 34 farmers with formal contracts with a large integrator), a multinomial logit model was used to identify the factors that determine the likelihood of engagement in formal or informal contracts. A simple probit model was subsequently developed for the determinants of engagement in informal contract arrangements.

Results indicate that farmers with higher levels of education and larger physical asset holdings are more likely to be engaged in formal contracts. The latter are largely limited to large-scale farmers (with mean holdings of about 600 pigs per farm) that specialized in pig fattening. In contrast, informal contracts are less exclusionary of smallholder producers. Households with higher levels of education, managing full-cycle pig operations, and with pig production being a main occupation, are more likely to engage in informal contracts, than remain independent

producers. However, rather than size of physical assets, social capital appears to be a more important determinant of engaging in informal contracts.

Providing a supportive policy and institutional environment for various informal contracting arrangements in pig production and marketing could improve access to markets and services by rural smallholder pig producers.

1. Introduction

The rapid growth in demand for pork in Viet Nam presents an opportunity for rural households keeping swine to improve their incomes. As a large proportion of livestock production in Viet Nam comes from rural smallholder producers who generally have limited access to markets, inputs, and livestock services, integrating these smallholders into the growth process could serve both Viet Nam's policy goals of poverty reduction and food self-sufficiency. One possibility of closer integration would be through institutional arrangements that provide smallholders better access to markets and livestock services.

In partnership with national and international research institutions, PPLPI initiated a field research project entitled 'Contract Farming for Equitable Market-Oriented Smallholder Swine Production in Northern Viet Nam' to identify forms of institutional arrangements in swine production that would enable smallholder producers to benefit from the demand growth for pork. The ultimate objective of the study was to identify a set of policy and other intervention options for the facilitation of profitable, market-oriented livestock farming partnerships between smallholders and larger enterprises.

This brief report summarizes initial findings on the major types of production activities swine producers engage in, as well as their scale of operations, in relation to their institutional production and marketing arrangements.

2. Methods

Field surveys were conducted in the provinces of Ha Tay and Thai Binh in the Red River Delta, in Bac Giang in the Northeast, and in Thanh Hoa in the North Central Coast. Four hundred swine producing households were included in the sample, consisting of 34 swine producers with formal (written) contracts with integrators, 166 producers with informal (unwritten) contracts with input suppliers and / or output traders, and 200 independent producers, i.e., farmers without any form of contract. Farmers with informal contracts were further sub-divided into those with contracts with cooperatives, and those with contracts with traders. Thirty-five (35) pig traders were

interviewed to obtain information regarding their relations with pig producers, particularly with those with whom they have engaged in informal agreements for the purchase of inputs or for the sale of pigs.

Participation of households in formal or informal contract farming was assumed to be determined by (i) the benefits that households obtain from engaging in contracts, (ii) the opportunities and constraints they face in engaging in contract farming, (iii) their capacities to comply with the requirements of such agreements, and (iv) the requirements that integrators of market intermediaries impose on farmers.

From the household survey, descriptive statistics on household demographics and farm characteristics were generated to determine and compare similarities and differences among households with contracts and independent producers. Using household and farm characteristics, a multinomial logit model was estimated to determine the likelihood of a household to engage in either formal or informal contracts. Having found that only a few households had formal contracts, which uniformly did not include smallholder pig producers, a probit model was developed to identify the factors that determine the likelihood that households engage in informal contracts.

3. Pig Production Activities and Contract Arrangements

There are mainly four types of pig production activities in which the pig producers in the sample engaged. These are: (i) farrow-to-weaning (piglet production); (ii) farrow-to-finish (full-cycle operation); (iii) grow-to-finish (pig fattening); and (iv) combined (multiple activities). The distinction between each of these activities has been described in a previous research report.¹

According to production and marketing arrangements, households are categorized either as: (i) engaged in written contracts with company integrators (Formal Contract); (ii) engaged in informal agreement with a cooperative (Informal-Cooperative); (iii) engaged in informal agreement with an input or / and output trader (Informal-Trader); or (iv) independent producers and sellers of pigs (Independent). The distribution of households engaged in these various production and marketing arrangements according to the four types of production activities is shown in Table 3.1.

¹ FAO-PPLPI Research Report. "Smallholder Contract Farming of Swine in Northern Viet Nam: Type and Scale of Production". December 2006.

Table 3.1: Distribution of households by production activity type and contracts (%)

Activity Type	Formal contracts (n=34)	Informal-Cooperative (n=129)	Informal- -Trader (n=37)	Independent (n=200)
Farrow-to-weaning	21	12	62	16
Farrow-to-finish		36	14	23
Grow-to-finish	79	7	5	23
Combination		44	19	39
Total	100	100	100	100

Source: Field Survey, 2005-06

Table 3.1 shows that pig producers under various types of contracts congregate in particular types of production activities. Most of formal contract growers are engaged in pig fattening (grow-to-finish). The majority of farmers with informal contracts are linked with cooperatives rather than with traders. Producers with informal agreements with cooperatives mostly undertake combined operations or specialize in full-cycle operations (farrow-to-finish). Most producers with informal agreements with traders focus on piglet production (farrow-to-weaning), the least feed-intensive activity. For independent producers, the largest concentration is in the combined operations, the most flexible among the activities, producing piglets for early revenues, as well as fattened hogs which generate larger revenues per head of pig.

The choice of production activity reflects resource endowments as well as resource constraints of households, opportunities presented by intermediaries, and desired activities preferred by contract partners (e.g. by company integrators).

4. Household and Farm Characteristics

Pig producers engaged in various production and marketing arrangements have similar as well as different household and farm characteristics that point to capacities and constraints in undertaking production and marketing of output independently, or with contract partners. Table 4.1 summarizes and compares the household groups according to selected demographic characteristics, resource endowments, and access to production and market services.

Table 4.1: Descriptive statistics of survey respondents by type of contract

Variable	Formal Contract (N=34)	Informal-Cooperative (N=128)	Informal-Trader (N=38)	Independent Producer (N=200)
Demographic characteristics				
Age (years)	45.35 (8.09)	45.08 (7.43)	42.65 (8.95)	43.31 (8.35)
Education (years of schooling)	11.65 (2.17)	10.31 (1.79)	9.19 (1.81)	9.27 (1.71)
Proportion of time in pig-raising (%)	80.45 (26.05)	60.81 (23.12)	37.35 (16.34)	49.92 (21.96)
Proportion of HH where pig raising is main occupation (%)	82.35	84.38	44.74	59.5
Assets				
Area of land owned (m ²)	4,523 (8,607)	2,993 (3,655)	3,122 (2,792)	2,668 (1,750)
Access to services				
Proportion of HH that received government loan (%)	38.24	54.69	26.32	40.5
No. of visits by veterinarian (per yr)	0.41 (1.18)	6.35 (7.57)	4.26 (3.87)	4.73 (6.63)
Distance to VBARD (km)	3.38 (2.66)	4.46 (4.09)	6.02 (3.37)	3.72 (2.79)
Distance to commercial supply (km)	3.06 (3.01)	4.90 (10.35)	2.09 (3.75)	1.60 (2.57)
Distance to vet shop (km)	2.47 (2.68)	5.55 (8.87)	2.21 (5.53)	1.61 (2.97)
Location				
Ha Tay (dummy = 1 if yes) (%)	73.53	16.41	10.53	25.00
Thai Binh (dummy = 1 if yes) (%)	0	34.38	15.79	25.00
Thanh Hoa (dummy = 1 if yes) (%)	0	35.16	13.16	25.00
Bac Giang (dummy = 1 if yes) (%)	26.47	14.05	60.52	25.00

Standard deviation in parentheses

VBARD: Viet Nam Bank for Agriculture and Rural Development

Source: ILRI-HAU-IFPRI-FAO survey (2006)

In general, livestock producers with contracts are of a similar age as independent producers. Formal contract growers have on average higher education than the other groups, with those with informal contracts with cooperatives coming second. Formal contract growers spend more of their time in pig raising than the rest, again with those engaged in informal contracts with cooperatives coming second. For both the formal contract growers and for those engaged with cooperatives, the proportion of households where pig production is the main occupation is higher than in the two other groups.

In terms of physical assets, formal contract growers on average have larger landholdings than the other groups.

For access to government credit and veterinary services, the group of producers with informal contracts with cooperatives appears to have an edge over the others. The apparently low frequency of veterinary visits to formal contract grower farms is surprising as integrator companies regularly provide veterinary services to their own contract growers. This low frequency may refer to visits by public veterinarians.

In terms of the physical distance to formal credit sources, farmers with informal agreements with traders appear to be the farthest away, also reflecting the lowest incidence of receiving government loans. Farmers engaged with cooperatives are the most distant from commercial supply centres and suppliers of veterinary inputs.

In terms of location, formal contract growers are located only in two provinces, Ha Tay and Bac Giang. Producers with informal agreements with traders are concentrated in Bac Giang. Farmers engaged in cooperatives are mostly found in two provinces, Thai Binh and Thanh Hoa. This finding indicates that opportunities for formally or informally linking with market intermediaries also depend on the existence and prevalence of such institutions in particular localities where the pig producers are, and is not just dependent on household characteristics.

5. Determinants of Participation in Contracts and Screening Mechanisms

Determinants of Participation

The econometric models used to identify determinants of participation in contract arrangements from a set of household and environment characteristics assume that participation is a product of individual choice. The choice to engage in a contract or not, however, takes place within a context where preference is set within a choice space defined by what is feasible and what is not. Thus the determinants point to individual capacities on the one hand, as well as to constraints on the other. The specification of the econometric model assumes that the decision to engage in a contract is influenced by socio-demographic characteristics of the household, asset holdings, access to inputs and services, and location. The multinomial logit model specification assumes that farmers will choose between one of the four possibilities: a formal contract with an integrator company, an informal contract with a cooperative, an informal contract with a trader, or remain independent.

The salient results of the multinomial logit model (not shown in a table), specifically with respect to formal contracts with company integrators, are that older farmers, with longer formal education, with more time devoted to pig production, with larger agricultural land assets, and located in a particular province, were more likely to participate in formal contract growing.

Viewed from a different angle, these same factors indicate some barriers that exclude other farmers who do not exhibit the same characteristics, and in particular, smallholders with lesser physical and human capital endowments.

As the predominant form of contracts in pig production in northern Viet Nam is of the informal type, and only large(r)-scale producers are engaged in formal contracts with integrators, a simple probit model for the determinants of participation in informal contracts, whether with cooperatives or with traders, was specified and tested. The results are shown in Table 5.1. For simplicity of presentation, focus is given to the marginal effects rather than to the likelihood coefficients as the statistically significant variables.

Table 5.1: Estimated marginal effects of the probit model for participation in informal contracts

Variable	Marginal effect	S.E.
Demographic characteristics		
Gender (dummy = 1 if male)	0.071	0.083
Age	0.005	0.004
Education	0.080***	0.021
Main occupation is pig-raising	0.213**	0.084
Proportion of time spent in pig production	-0.002	0.002
Assets		
Area of agricultural land owned	-3.62e-06	0.00002
Production system		
Grow-to-finish (dummy = 1 if yes)	-0.511***	0.059
Piglet prod & fattening combined (dummy = 1 if yes)	-0.436***	0.106
Total weight sold	5.90e-07	1.94e-06
Social capital		
Member of coop. (dummy = 1 if yes)	0.692***	0.058
Access to services		
Government loan (dummy = 1 if yes)	0.116	0.075
No. of visits by veterinarian	-0.006	0.005
Distance to VBARD	0.033**	0.014
Distance to commercial supply	0.040**	0.015
Distance to veterinary shops	0.009	0.010
Location		
Ha Tay (dummy = 1 if yes)	-0.420***	0.080
Thai Binh (dummy = 1 if yes)	-0.466***	0.078
Thanh Hoa (dummy = 1 if yes)	-0.360***	0.094
Number of observations: 319; Wald chi ² (18): 110.38; Probability > chi ² : 0.0000;		
Log pseudo likelihood: -128.77; Pseudo R ² :0.41		
Proportion correctly predicted of informal contracts: 82%		
VBARD: Viet Nam Bank for Agriculture and Rural Development		

The results indicate, that producers with longer formal education and whose main occupation is pig raising, are more likely to have informal contracts. Specialization in the full-cycle (farrow-to-finish) activity also increased the likelihood of having informal contracts.

Notable is that size of land assets and scale of production were not identified as significant determinants. Social capital, however, appears to be important as demonstrated by the significance of being a member of a cooperative.

Access to formal credit (VBARD) and to commercial supply of inputs were also identified significant, with the sign of the coefficients implying that producers with relatively more constrained access to inputs and services were more likely to participate in informal agreements with intermediaries.

Other things equal, location, too, was found to be a significant determinant, indicating that the opportunities for engaging in informal contracts with market intermediaries vary with the presence of such intermediaries in particular areas.

Screening Mechanisms by Traders

Participation in informal contracts by pig producers has also another dimension. Not only do producers choose to engage in informal contracts or not, weighing the advantages and disadvantages, but market intermediaries also make choices about whom to include or exclude from production or marketing agreements. Traders screen potential partners for marketing agreements and for the renewal of these agreements - be it for the supply of inputs on credit, or for the purchase of piglets or slaughter hogs for the market. Most informal agreements are for the provision of crucial inputs like feed on credit and the repayment at a later period. Relatively fewer agreements pertain purely to the supply of pigs to a trader and the payment of these at a later date, although some pig traders are at the same time engaged in the supply of inputs. Table 5.2 presents the conditions that traders consider, in varying importance, in screening potential informal contract-partners, and in renewing informal contracts.

Table 5.2: Distribution of responses of traders on factors considered for entry into, and renewal of contracts with pig producers, northern Viet Nam, 2005.
(In percent of group with recurrent market transactions with producers)

Considerations / Conditions	Input traders (n=34)		Pig buyers (cum input trading) (n=16)	
	Entry into contracts	Renewal of contracts	Entry into contracts	Renewal of contracts
Size of pig inventory	67.6	23.5	12.5	18.8
Volume of feed use	50.0	32.4	0.0	12.5
Breed of stock	44.1		0.0	
Good reputation (repayment/supply)	44.1	35.3	31.3	56.3
Farmer experience	17.6		12.5	
Size of landholding	8.8		0.0	
Properties of the farmer	8.8		0.0	
No conditions	0.0		68.8	
Risk		17.6		6.3

Source: Field survey, 2005-06

Among input traders, when considering entry into a contractual relation with a producer, preferences are to engage with larger-scale farmers, indicating a larger volume of business transaction and lower transaction cost per farmer. In the renewal of contracts, however, the reputation of the farmer in the capacity to promptly pay for inputs provided on credit becomes the prime consideration, although scale considerations remain important.

Buyers of pigs (some of whom also supply inputs), on the other hand, appear to be more open in entering into a contractual agreement with pig producers. Once having entered into an informal agreement, however, the reputation of producers in their capacity to supply the required pigs according to the agreement becomes the primary consideration for contract renewal. The scale of production of the farmer does not come out as prominent consideration.

6. Conclusions

- In the choice of a pig production activity to engage in, most households in northern Viet Nam prefer to engage in an activity that provides flexibility in producing / selling output, such as receiving immediate cash from selling some piglets, and obtaining a larger income from selling slaughter hogs at a later date. Integrator companies have their own preferences, however, in engaging into formal contracts with pig producers, concentrating in pig fattening (grow-to-finish), where the production cycle is the shortest (3-4 months), and the input and output relations in the underlying technology are definite and predictable.

- There are major constraining factors that tend to exclude smallholders from engaging in formal contracts, among which are human and physical capital endowments and scale of production.
- Informal contracts tend to be less exclusionary of smallholder pig producers, although higher levels of formal education and a higher level of market orientation of the pig business are helpful (perhaps a consequence of these informal contracts). Social capital, rather than physical capital *per se* is an important determinant for participation. Barriers to access to inputs and services, rather than impeding participation, appear to motivate producers to overcome these through informal agreements with market intermediaries.

7. References and Related Reports

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