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MARKETS, TRADE AND INSTITUTIONS DIVISION

March 2005

MTID Discussion Paper No. 83

High Value Products, Supermarkets and Vertical Arrangements in Indonesia

Shyamal Chowdhury, Ashok Gulati, and E. Gumbira-Said

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ABSTRACT

Indonesian economy has experienced some major changes during the last three decades and transformed from a predominantly agricultural economy to one that relies more heavily on its non-agricultural sector. Within agriculture, there has also been a change in the contribution of different sub sectors and high value products have grown relatively rapidly making agriculture more diversified. Similar to the changes in agricultural production, food consumption in Indonesia has shown a pattern of change over the past three decades, from a diet characterized primarily by the staple foods of cereals and cassava, to one that includes a larger share of fruits, fish, meats, dairy products and processed foods. Alongside the change in composition of food demand, newer forms of retail have also come up commonly known as supermarkets. However, the emergence of modern retailing has other consequences that go beyond consumers. It requires deep integration with farmers and can influence the production and transaction costs at farm level. It can also influence the distribution of value among different agents involved in production, intermediation, and retailing.

In this paper we pursue three interrelated objectives. First, we review the structural changes that have taken place in Indonesian agriculture for the last three decades and the state of high value products. Second, we examine the driving forces behind the production of high value products and the constraints that limit their production. Third, we review the emergence of supermarkets and the vertical arrangements among farmers, traders/distributors, and supermarkets. We have relied both

on primary and secondary data sources. Most of the secondary data has come from government directorates, different ministries and the central bureau of statistics (CBS) of the Government of Indonesia. In cases where secondary information was not readily available, we have also collected primary data.

Our findings suggest that during the last three decades, there has been a significant structural change in Indonesian agriculture and the production of high value commodities and products –estate crops, livestock, fisheries, fruits and vegetables, and floriculture – has grown faster than the cereals. However, the extent of diversification towards high value products has remained limited to few regions and to few products within each sub sector. Factors that have contributed most in diversification are the rapid growth in income and accompanied changes in urban consumption in favor of high value products and agricultural mechanization. The economic crisis that was triggered by the currency crisis has had a long negative impact on agriculture sector

Structural changes in Indonesian agriculture have been accompanied by changes in consumption pattern in urban areas in favor of high value products and by a major change in retailing in the form of growth of modern supermarkets. To cater to the demand of changed urban consumption needs, supermarkets have been integrating with farmers through formal and informal contracts. This vertical relationship between farms and supermarkets that has been emerging in Indonesia has been helpful to follow grades and standards, to improve quality, and to reduce transaction costs and information asymmetries. It has also been helpful to reduce price and production risks at farm level

and to ensure a higher price for farmers compared to traditional value chain. However, it seems that the participation of small holders in the vertical relationship depends largely on vendors. Within the vertical chain, supermarkets appropriate a monopsony rent. Important policies that can be drawn from this study are the greater emphasize on rural infrastructure, user right of state-owned estate to smallholders, promotion of public-private partnerships, encouragements of vertical arrangements, grades and standards, and bringing up the modern retailing sector under the purview of regulatory oversights.

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HIGH VALUE PRODUCTS, SUPERMARKETS AND VERTICAL ARRANGEMENTS IN INDONESIA

Shyamal Chowdhury[1], Ashok Gulati[2], and E. Gumbira-Sa'id[3]

1. INTRODUCTION

Indonesian economy has experienced some major changes during the last three decades and transformed from a predominantly agricultural economy to one that relies more heavily on its non-agricultural sector.[4] Though the relative decline in the share of agriculture in income and employment is a central feature of economic development, the transformation has proceeded relatively rapidly in Indonesia. The relative contribution of agriculture to GDP has declined from a share of around 45% in 1970 to around 16% in 2001 (WDI 2003). Within agriculture, there has also been a change in the contribution of different sub sectors and high value products (HVP) such as livestock, fisheries, fruits and vegetables have grown relatively rapidly making the agriculture as a whole more diversified.

Similar to the changes in agricultural production, food consumption in Indonesia has shown a pattern of change over the past three decades, from a diet characterized primarily by staple foods of cereals and cassava, to one that includes a larger share of fruits, fish, meats, dairy products and processed foods.[5] During this period, the GDP per capita grew at an annual average rate of above 5% starting from 1970 to just before the

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[4] See Martin and Peter (1993).
[5] See SUSENAS data 1981 to 2003 from CBS (Central Bureau of Statistics, Indonesia).

economic crisis. Given that Indonesian consumers tend to spend a high proportion of their income on food,[6] and given that the income per capita has been rising for a considerable period of time, all these will have consequences on the demand and supply of high value agricultural products.

The shift in consumption towards high value products has accompanied by an increased urbanization of population, and concomitant lifestyle changes. In fact urbanization in Indonesia has occurred at a remarkably consistent rate of 5% per annum starting from the early seventies. As a result, the percent of population living in urban areas has doubled from 20% in 1976 to 40% in 1999. This figure is projected to increase to over half the population by the year 2020 (Edwards et al. 1995).

Alongside the change in composition of food demand, newer forms of retail also arise, as can be seen in the case of Indonesia. These large retail outlets, known as supermarkets and hypermarkets,[7] are better suited to handle high-value foods and are designed to cater to modern lifestyles. The changes in dietary and living habits and the changes in the forms of food retail tend to mutually reinforce each other. However, the emergence of modern retailing has also other consequences that go beyond consumers. It requires deep integration with farmers and can influence the production and transaction costs at farm level. It can also influence the distribution of value among different agents involved in production, intermediation, and retailing.

[6] Selvanathan (1993) found that Indonesia's share of food expenditure in total spending was much higher than the "world" average, in a sample of developed and developing countries. A study by Clements and Chen (1994) found that Indonesian food consumption over time is consistent with the strong version of Engel's law, which predicts a drop in food expenditure by 1% with every 10% increase in incomes.
[7] The difference between supermarkets and hypermarkets in Indonesia is based on retailing space.

Given the above changes in income, consumption, urbanization, lifestyle, and in retailing industry, it is obvious to assume that all these factors have influenced the diversification and vertical arrangements in Indonesian agriculture. The aim of this paper is to study the changes in agriculture and the effects of all these factors. More specifically, we pursue three interrelated objectives in this study. They are:

- First, to review the structural changes that have taken place in Indonesian agriculture for the last two to three decades and the state of high value products.[8]
- Second, to examine the driving forces behind the production of high value products and the constraints that limit their production.
- Third, to review the emerging vertical arrangements among farmers, traders/distributors, and supermarkets, and to identify the changes in market organization, value distribution and the arrangements of smallholders.

To carry out this study, we have relied both on primary and secondary data. Most of the secondary data has come from government directorates, different ministries and the central bureau of statistics (CBS/PBS) of the Government of Indonesia.[9] In cases where secondary information was not readily available, we have collected primary data through rapid appraisal surveys. The rapid appraisal survey is a method of gathering information directly from the source. It is a widely used method, and if well designed and executed, it can generate insights and information rarely obtained in a formal survey in a relatively

[8] Due to data unavailability, some products are covered for less than two decades.
[9] See the reference section for the exact sources.

short period of time. We have also collected information from key informant interviews, opinions of local experts, and from professional associations.

The paper proceeds as follows: in Section 2 we review the structural changes in agriculture and production of high value products. We look at the relative contribution of agriculture to GDP and the contribution of different sub sectors within agriculture. We also review the state of high value products, particularly, the progress made in estate crops, livestock, fisheries, fruits and vegetables, and floriculture production. We review both production and trade. In Section 3 we empirically examine the factors that are responsible for the production of high value products. We also review the extent of transaction costs as a constraint. Section 4 is concerned with the modern retailing industry. We review the emerging vertical arrangement and compare it with the traditional value chain, value distribution, and smallholders' participation in the emerging value chain. Finally, in Section 5, we conclude the study with some policy implications.

2. STRUCTURAL CHANGES AND DIVERSIFICATION TOWARDS HVPs

In this section, we will review the structural changes and diversification that have been taking place in Indonesian agriculture during the last three decades. We will review the role of agriculture in national income and employment. We will also review the state of some high value products in Indonesia. More specifically we review the progress made

in estate crops, livestock, fisheries, fruits and vegetables, and floriculture production.[10] In addition to the production, we will also review international trade in these products as a part of diversification and commercialization of high value agriculture.

The aim of the review is two fold: first, to review structural changes in agriculture and state of diversification towards high value products, and second, to set the ground for empirical analysis that we will carry out in the next section.

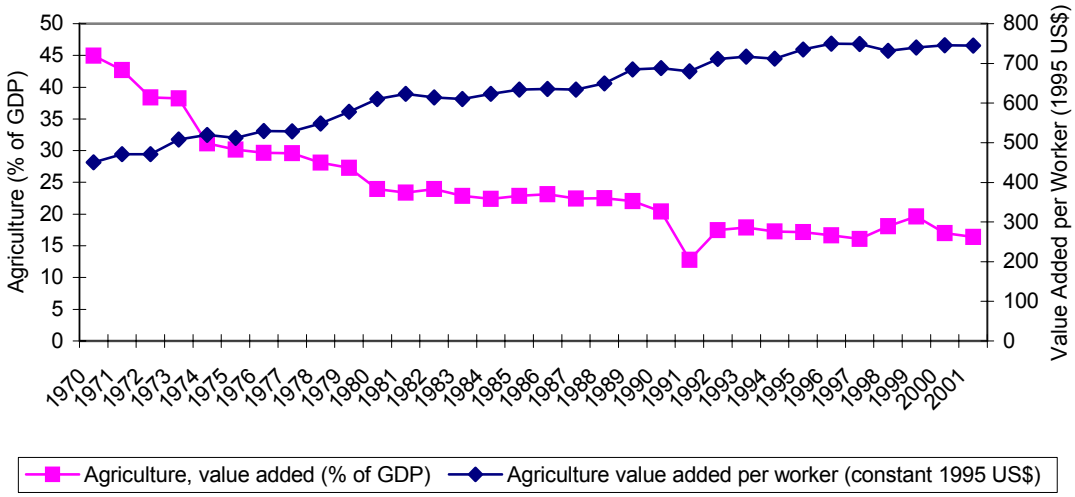
2.1 STRUCTURAL CHANGES IN INDONESIAN AGRICULTURE

2.1.1 Income and Employment

During the last three decades, there has been a significant structural change in Indonesian agriculture both in terms of its contribution to national economy and the composition of different sub sectors within agriculture. As can be seen from Figure 1, agricultural value added as a % of GDP declined from around 45% in 1970 to around 24% in 1980. The decline was relatively slow in the 1980s but continued and by 1990 the relative share of agriculture reached 20.42%. It is interesting to note that before the currency crisis in 1996, agricultural value added was 16.67% of GDP, but during and after the crisis, the importance of agriculture increased and the value went up to 19.61% in 1999. However, by 2001, it returned to its historical trend and continued to decline thereafter.

[10] For detailed results, case studies conducted under each of these categories can be consulted. The appropriate reference will be followed in this section.

Figure 1—Agriculture Value Added: 1970-2001



Source: Data from WDI 2003.

However, the relative decline of agriculture in national GDP has not happened due to a decline in agricultural value added. As can be seen from Figure 1, the agriculture value added per worker increased from around US$450 in 1970 (constant 1995 US$) to around US$610 in 1980 and further still to around US$688 in 1990. Before the crisis in 1996, the value added per worker per annum in agriculture stood at around US$750. Compared to countries with a similar level of income, such as China, which had an agricultural value added of US$298 per worker in 1996, Indonesian agriculture had performed reasonably well. During the periods 1971-80, 1981-90 and 1991-96, the average growth in agricultural value added per worker per annum was 3.12%, 1.23% and 1.45%, respectively. After the crisis, however, Indonesian agriculture experienced an absolute decline in terms of value added per worker and during 1997-2001, value added per worker contracted at a rate of –0.11% per annum. The relative contribution of

agriculture in total value added, however, increased during that time due to a sharp decline in the share of non-agricultural value added (WDI 2003).

Unlike agricultural GDP, the share of agricultural employment in total employment declined much more slowly, from 66.4 percent in 1970 to 53.8 percent in 1990 and to 44.0 percent in 1996 (Figure A1 in Appendix). However despite a slow decline, the share of agriculture in total employment decreased to below 50% even before the economic crisis. Similarly the share of rural employment in total employment declined from 87% in 1970/71 to 74% in 1990 and to 67.7% in 1996.

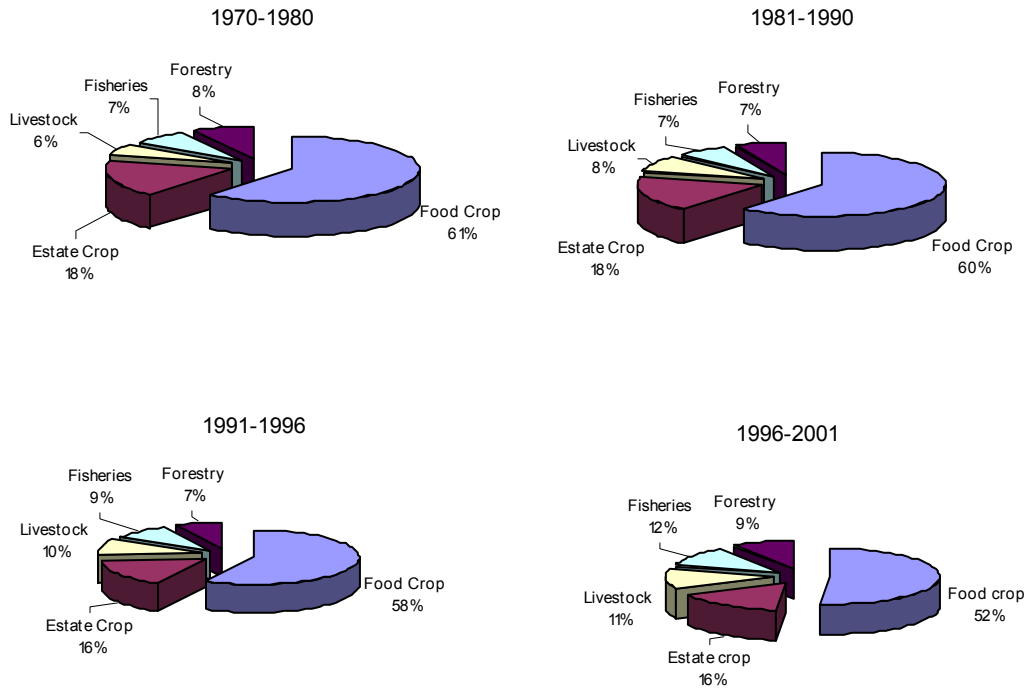
In the period of 1991-1996, national GDP grew at an annual rate of 7.9 percent, whereas agricultural GDP grew at a rate of 3.4 percent. Agricultural employment declined at a rate of 1.8 percent per annum, and aggregate employment growth was 2.2 percent per annum. During the economic crisis, this transformation was reversed, and agricultural employment increased at a rate of 13.3 percent annually and rural employment increased from 34.8 million (40.7 percent) in 1997 to 39.7 million or 43.8 percent of total employment in 2001 (CBS, National Labor Force Survey, 1998 and 2001). The data indicates that agriculture acts as a national shock absorber.

2.1.2 Agricultural Sub Sectors

Similar to the changes in terms of contribution to GDP and to rural income and employment, there has also been a change in output composition within the different sub sectors of agriculture. Figure 2 shows the contribution of different sub sectors within agriculture. Among the five sub sectors – food, estate crop, livestock, fisheries and forestry – it is food that has experienced the greatest decline. While food contributed

more than 61% of Indonesian agricultural GDP on an average during 1970-80 period, its contribution declined to 52% during the late 1990s.

Figure 2—Share of Different Sub-sectors within Agriculture, 1970-2001



Source: Data from National Income Accounts, CBS, Jakarta 1970-2001

The next largest contributor to agricultural GDP is the estate crop sub sector and its contribution in 1970-80 was around 18% of agricultural GDP. However, it has also experienced decline in its relative contribution to the agricultural GDP in the 90s. After the food sub sector, it is the estate crop sub sector that has faced the greatest loss in relative importance.

Unlike food sector, livestock and fisheries experienced an increase. During the period from 1970 to 2001, the contribution of non-crops high value products - including

livestock, fisheries and forestry - increased from around 21% in 1970-80 to more than 32% in 1996-2001. In fact, after the crisis, the increased contribution of agriculture in national GDP seen in Figure 1 came primarily from the non-food sub sectors while food sub sector continued to decline. The contribution of fisheries to the increased agricultural GDP was followed by the contribution of forestry and livestock.

2.2 DIVERSIFICATION TOWARDS HIGH VALUE PRODUCTS

2.2.1 Production

A. Estate crops[11]

During the last three decades, the development of estate crops in Indonesia has been very fast. Based on the production volume in 2002 (Table A1 in Appendix), the major estate crops in Indonesia according to importance are oil palm, coconut, rubber, cacao, sugar cane, coffee, cashew nut, and pepper. Among the five major estate crops based on production, coconut and oil palm grew fastest and rubber and sugarcane grew the least. Interesting to note is that after the recent economic crisis, the production of coconut and oil palm continued to grow at a rate of around 12% and 8% per annum, respectively, between 1997 and 2002. For oil palm, one incentive was the rapid devaluation of currency that helped to boost export earnings.

Table A2 in Appendix shows the productivity of major estate crops for the same period between 1971 and 2002. It is interesting to note that the productivity difference between state-owned oil palm estates and private oil palm estates. Starting from 1971,

[11] See D. Prabowo and I. Gonarsyah (2003) for a detailed case study on Estate Crops.

while there has been a continuous improvement in productivity in oil palm production in state-owned estates, productivity has been fluctuating in private-owned large estates, and starting from late 80s, there has been continuous erosion in productivity in private-owned large estates. In contrast, though the productivity of smallholders estates was very low at the beginning, they have been catching up and have surpassed the productivity attained in private-owned large estates production.

With a few exceptions such as oil palm and sugar cane, small holders have dominated estate crop production. In some crops such as coconut, coffee, cashew nut, and pepper, the total area of production under small holders has been 90% or higher. This pattern has been continuing even after three decades. In other cases, such as oil palm, and sugar cane production, the share of small holders has historically been low. However, this has been changing. While the average share of small holders in the total area of production of oil palm was 0.12% in 1971-80, their share increased to 13.84% in 1981-90, and to 30.09% in 1991-1996. Similar pattern can be observed in the case of cacao production. While the share of small holders in cacao production in 1971-80 was 33.59%, it increased to 51.47% in 1981-90, and to 70.04% in 1991-96 (Source: CBS, various year).

B. Livestock[12]

Table A3 in Appendix provide the beef cattle, poultry, and other small animal population in Indonesia for the period of 1985 to 2001. During this period, Indonesian domestic meat industry had undergone significant changes. Between 1985 and 1995, the

[12] See A. Natasukarya and F. Kasryno (2003) for a detailed case study on Livestock.

total meat production increased two-fold. However, most of this increased meat production came primarily from broiler production followed by beef. While broiler contributed only 16% of total meat production in 1985, its contribution increased to more than 40% in 1995. The contribution of water buffalo decreased both in absolute terms and so also its relative importance. While in 1985 it contributed more than 6% of total meat production, its contribution reduced to less than 3% in 2001. It is noticeable that despite the commercialization of poultry production, native chickens remain an important source of meat in Indonesia contributing more than 18% of total meat production. The production of pigs experienced a rapid growth before the crisis but its relative contribution decreased and in 2001, it contributed less than 6% of total meat production.

The economic crisis of 1997/98 significantly damaged the livestock sector and production did not recover to the pre-crisis level even in 2001, four years after the crisis. For Indonesia as a whole, the total meat production in 2001 was less than the total meat production in 1995, and except for the broiler production, the total meat production in each of the other categories in 2001 was less than that in 1995. Except for Bali and N. Tenggara, the total meat production in all the other islands had not reached the pre-crisis level in 2001.

C. Fisheries[13]

Table A4 in Appendix provides fish production in Indonesia categorized into two broad sources, marine fisheries and inland fisheries, and for the various sub sectors within each category for the period of 1970 to 1999. Fish production in 1970 was 1.2

[13] See Ringler and Y. Indra for a detailed case study on Aquaculture.

million metric tons or 10.45 kg fish per capita. Between 1970 and 1995 before the economic crisis, fish production grew at a rate of 5.12% per annum and the total fish production reached 4.3 million metric tons in 1995. This represented 22.12 kg fish per capita, which is more than a two fold increase in the per capita availability of fish production. During and after the economic crisis, the growth rate declined and between 1996 and 1999, the total fish production grew at a rate of mere 2.62% per annum.

In terms of two major sources, marine fisheries and inland fisheries, the marine fisheries contributed 66% of total fish production in 1970 and due to a higher rate of growth of marine fisheries compared to inland fisheries, marine fisheries' share increased to around 80% by 1999.[14] In the case of inland fisheries, most of the growth came from aquaculture and between 1970 and 1995 aquaculture grew at a rate of 6.6% per annum albeit from a small base. In 1970, the major source of inland fisheries was inland open water. However over the last three decades, inland open water fisheries had remained stagnant and as a result, its total contribution had declined from more than 23% in 1970 to 7.73% in 1995 and to 6.93% in 1999.

D. Fresh Fruits and Vegetables (FFV)

FFVs belong to the food sub sector. However, unlike food sub sector that has been declining over the years, FFVs have been growing fast. Table A5 in Appendix shows the average annual production of selected fruits and vegetables for the period of

[14] The trend in Indonesian fisheries did not follow the world fish production shown in Delgado et al (2003) where aquaculture is the engine of growth in the world fish production, particularly in developing countries.

1986 to 2000. All products shown in the table experienced a positive growth, and grew at a rate of 5% or more on a year-to-year basis for the last 15 years.

Table A6 and Table A7 in Appendix show area and yields under selected FFV, respectively. Between the two types of expansion, horizontal expansion - through an increase in the area under high value products - and vertical expansion - through an increase in the yield of high value products, it seems that the latter contributed more to the increased production of FFV. While the correlation coefficient between the growth in area and the growth in production for the period of 1970 to 2000 is 0.315, the correlation coefficient between the growth in yield and the growth in production for the same period is 0.797. However, despite the increased yield in fruits and vegetables production, the productivity per hectare remained relatively low compared to other countries. For instance, while the production of tomatoes per hectare in the year 2000 in Indonesia was 12.12 metric tons, the production in Thailand was 22.58 metric tons and in the USA was 69.19 metric tons. (Source: FAO Stat, see Table A8 in Appendix). Therefore, there is scope for vertical expansion without competing with other products for horizontal expansion.

E. Cut Flowers[15]

Information on floriculture production is relatively scant. According to the floriculturists association, ASBINDO, there are approximately 100 growers at present (2003) of which 35% are "large" and the rest are "small" growers, where "small" growers correspond to those with a farm size that varies from 0.1 hectares to 0.4 hectares. Small

[15] Gumbira-Sa'id (2003a) for a detailed case study on cut flowers that contains more information.

growers usually build traditional green houses with an investment of only US$1000 per hectare while large growers build modern greenhouse with an approximate investment of US$100,000 per hectare. Floriculture production in Indonesia is concentrated on the mountainsides of East and West Java, Bali, and Sumatra.[16]

In comparison to paddy, employment and revenue per unit of land in floriculture is around 10 times that of paddy production (ASBINDO). Since floriculture employs unskilled workers also, the growth is well distributed. Though the wage rate relative to paddy is lower in floriculture, floriculture ensures year-round employment. In contrast to crop agriculture that tended to be male dominated with a male-female ratio of 60:40 in 1999 (source: Central of Bureau Statistics (CBS), Indonesia), for floriculture the ratio was roughly 50:50. However, floriculture requires investment in modern green houses, which is very capital intensive.

Domestic demand for cut flowers in Indonesia has been growing at a rate of 15% to 20% per year. While the major share of world demand for floriculture consists of flowers (55%), followed by decorative leaves (40%) and orchids (5%), the major share of domestic demand in Indonesia consists of decorative leaves (60%), followed by orchids (25%) and flowers (15%).[17] Domestic use of flowers is relatively negligible. The major local uses of flowers in Indonesia are in wedding parties, followed by in hotels and restaurants.

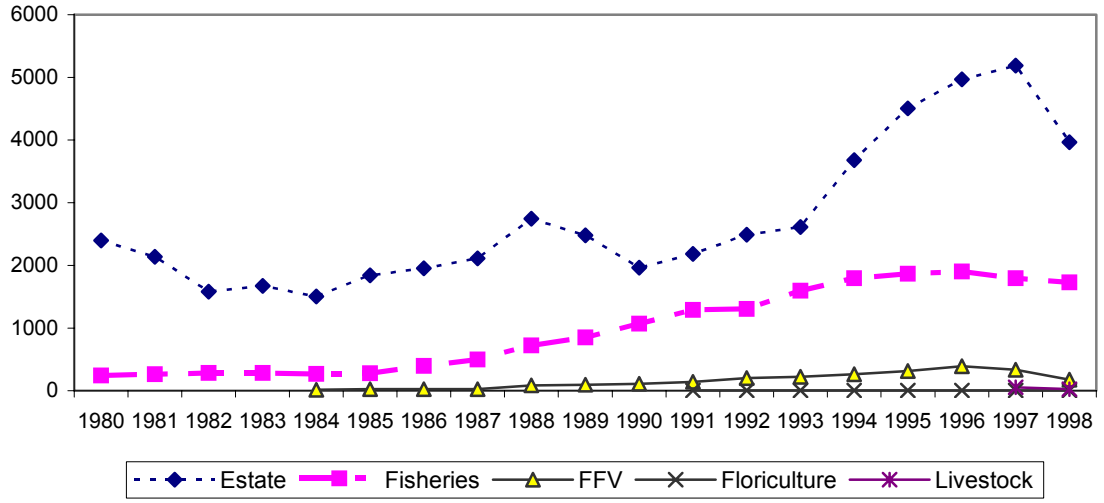
[16] Most of the information in this section came from ASBINDO. ASBINDO is an association established by floriculturists who are producers and sellers of flowers and ornamental plants. As a part of rapid rural appraisal, we met with ASBINDO officials on September 8, 2003 in Jakarta.
[17] Source: http://www.bi.go.id/sipuk/1m/eng/cut_flower/pemasarn.htm, access date 7/16/2003.

2.2.2 Trade

Figure 3 shows the total trade in high value products (HVP) for the period of 1980 to 1998 where total trade is defined as the sum of export and import, and expressed in million US dollars. Tables A9, A10, A11, A12, A13 in Appendix show the export and import value of HVP separately. It is obvious from Figure 3 that for the decades of eighties and nineties, estate crops dominated trade in (HVP). However, starting from the late eighties, trade in fisheries had picked up and continued to grow and unlike estate crops, fisheries did not show year-to-year fluctuations due to a stable international price. Similarly, trade in fresh fruits and vegetables (FFV) started rising from late eighties. Noticeably, despite a production boom, trade in livestock remained insignificant during the last two decades. Similarly, trade in floriculture remained very insignificant. However, the sector itself had a small size relative to other HVP.

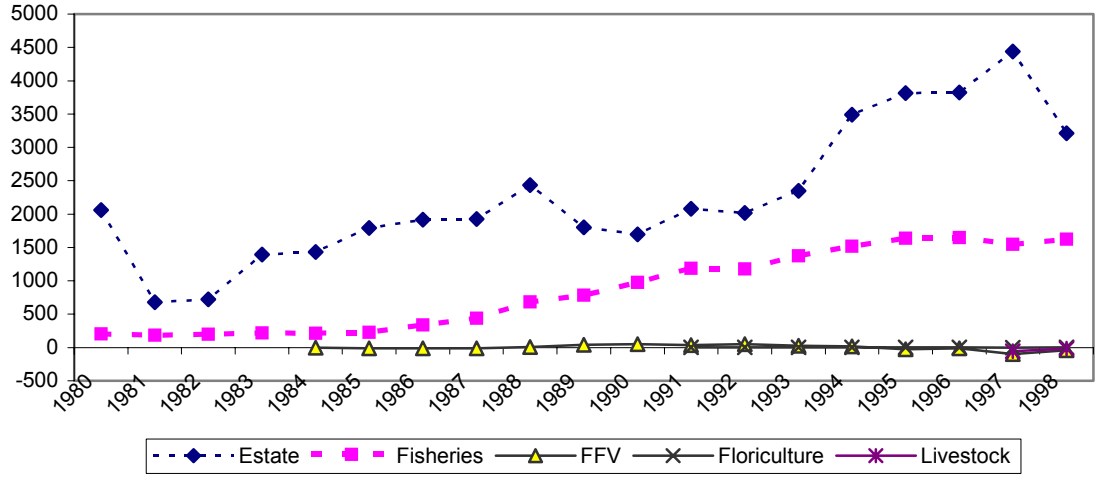
Figure 4 shows the net trade defined as export minus import in HVP for the period of 1980 to 1998 similar to Figure 3. During this period, for the two most important categories for trade, estate crops and fisheries, the net trade was highly correlated with total trade. Therefore, estate crops led the net trade followed by fisheries. However, unlike estate crops and fisheries, net trade in FFV changed position from deficit in the mid eighties to surplus in the early nineties to deficit again in the late nineties. For livestock, the net trade was again highly correlated to total trade but unlike estate crops and fisheries, it was always in deficit. In contrast to livestock, floriculture maintained a trade surplus albeit at a very small size.

Figure 3—Total Trade (Export+Import) in million US$, 1980-98



Source: Data from the Directorate General of Agricultural Product Processing and Marketing Department, various years.

Figure 4—Net (Export-Import) in million US$, 1980-98



Source: Data from the Directorate General of Agricultural Product Processing and Marketing Department, various years.

2.3 TRANSFORMATIONS AND CONSTRAINTS

From the above descriptions, it is evident that Indonesian agriculture has been undergoing some significant transformations during the last three decades. First, there has

been a dramatic decline in the role of agriculture in the total economy. Given the fact that even a major economic shock could not change the declining trend, it is expected to continue for the near future.

Second, in the case of employment, though less dramatic than the structure of national GDP, the composition of employment between agriculture and non-agriculture has undergone a similar structural change in Indonesia during the last three decades. As a result, the share of agricultural employment in total employment has declined to below 50%. Similarly, the share of rural employment in total employment has also experienced a relative decline during this period. Therefore, there is an urbanization of employment in general and non-agriculture sector has emerged in rural areas in particular.

Third, there has been a change in the relative contribution of different sub-sectors. Among the five sub sectors that we have examined here – estate crops, livestock, fisheries, FFV, and floriculture – all of them had grown faster than the cereals in the 1980s and 1990s and contributed towards diversification, particularly before the economic crisis.

Fourth, despite some positive developments, the overall progress in agricultural diversification was slow both in terms of products and in terms of regional concentration. Within each sub sector, a few products had driven the growth. For instance, the oil palm drove the growth in production and export earning of estate crop sub sector, and the broiler chicken largely drove the growth in livestock production. Similarly, Java contributed more than 60% of major food crops, livestock and floriculture production.

Fifth, there is a major scope to increase the productivity in estate crops production both in small holders and large holders production. In recent years, there has been a divergence between the productivity of private-owned oil palm estates and state owned oil palm estates. It is necessary to find the reasons behind this productivity divergence. Similarly, productivity in FFV can be increased further as productivity in Indonesia remains much lower than in many other countries.

Sixth, though the currency crisis was devastating in many respects, it also opened opportunity for the exporters. Following this opportunity, export earnings of some of the commodities have shot up. However, for FFV, and fisheries, export did not pick up immediately after the crisis. One reason that has been put forward by one of the exporters during our rapid rural appraisal survey is the high freight costs that Indonesian FFV exporters need to incur compared to exporters from neighboring countries such as Thailand.

Seventh, there remains high potential in fish exports due to high external demand. Reasons behind the stagnation in inland open water fish need to be examined. Though export has experienced a double-digit growth before the economic crisis, the scope of further expansion still remains to be explored. One noticeable feature of fish export is that the export volume and value grew almost at the same rate implying that there is a stable international price that has been prevailing for the fish products that Indonesia exports.

Eighth, though the world floriculture market has reached its maturity stage, there is a wide scope for Indonesian producers to increase their market share. Therefore, there

is an option for large-scale enterprise development. However, a small domestic market, high inter-provincial taxes created by decentralization, and high import tax on seeds, plants, fertilizers and pesticides for floriculture act as constraints.

Ninth, both total trade and net trade were dominated by two sub sectors, namely, estate crops and fisheries. However, while the trade in estate crops and fisheries were external demand driven, trade in livestock was domestic demand driven, and trade in FFV was driven by both internal and external demand.

3. DRIVERS OF HVPs

In the last section, (Section 2), we have described the structural changes in agriculture and the state of diversification of five categories of high value products (HVPs) within agriculture. The aim of this section is to examine the important factors that have contributed to the production of HVPs. Among the five categories, we will examine some selected products from fresh fruits and vegetables (FFV). The selection of products is largely driven by the availability of time series data at province level. Once the factors are examined, we will look at the transaction costs that act as constraints to the production of HVPs.

The declining importance of agriculture in GDP and employment is often attributed to a number of factors. Important amongst these are: (a) relatively low income-elasticity of demand for food (Schultz 1953), (b) relatively lower rate of technical progress in agriculture when compared to non-agriculture (Chenery et al 1986), and (c) different rates of capital accumulation in agriculture and non-agriculture, which results in

a change in capital and labor endowments between the two sectors. This in turn leads to a decline in the share of the relatively labor-intensive agricultural sector in total output, and a relative increase in the output share of the capital-intensive non-agricultural sector.

However, despite the overall decline in the relative role of agriculture, there was a shift in production in favor of HVPs and away from cereal production resulting in a higher share of HVPs within agriculture. Among these three factors, the Schultz's hypothesis partly explains the changes in composition within agriculture. While the income elasticities for cereals in Indonesia in 1981 were 0.18 in urban areas and 0.41 rural areas, by 1993, they declined to 0.08 and 0.31, respectively. However, in the case of vegetables, the income elasticities remained very high and had declined only marginally (0.6 to 0.55 in urban areas, and 0.89 to 0.74 in rural areas), and in the case of fruits, it actually increased from 1.56 in 1981 to 1.82 in 1993 (Widjajanti 1996).

Turning to the technological change, as we will see in this section that agriculture in Indonesia has been marked by a considerable degree of technological change, particularly for the decades of eighties and nineties. In fact, agricultural growth in Indonesia has been propelled partly by small-scale mechanization. However, since the use of mechanization was not entirely through a labor replacing technology, labor replacement was relatively slower that would have otherwise been observed in the course of development. In fact Martin and Warr (1993) for a period of 1960 to 1987 found that technical change in the Indonesian economy during this period was biased toward the agriculture sector, and the factor accumulation appeared to be overwhelmingly important.

These two factors, high-income elasticity of demand for HVPs, and agriculture biased technological change, along with other factors, should have important consequences for the production of HVPs in Indonesia.

3.1 POTENTIAL FACTORS

At a given point, there are both demand side factors as well as supply side factors that contribute to the diversification of agriculture towards high value products (Pingali and Rosegrant 1995, Joshi et al 2003). Typical demand side factors are changes in lifestyle and dietary composition of population at home and abroad due to changes in incomes and. On supply side, the important factors to be considered are relative profitability of high value products compared to traditional alternatives, factor endowments and the rate of technological change. However, since the types of high value products that we are considering in the specific case of Indonesia are perishable in nature, the availability of rural infrastructure and institutions can also play a significant role. Following earlier evidence in similar settings (Joshi et al 2003), we will consider all these factors in our analysis.

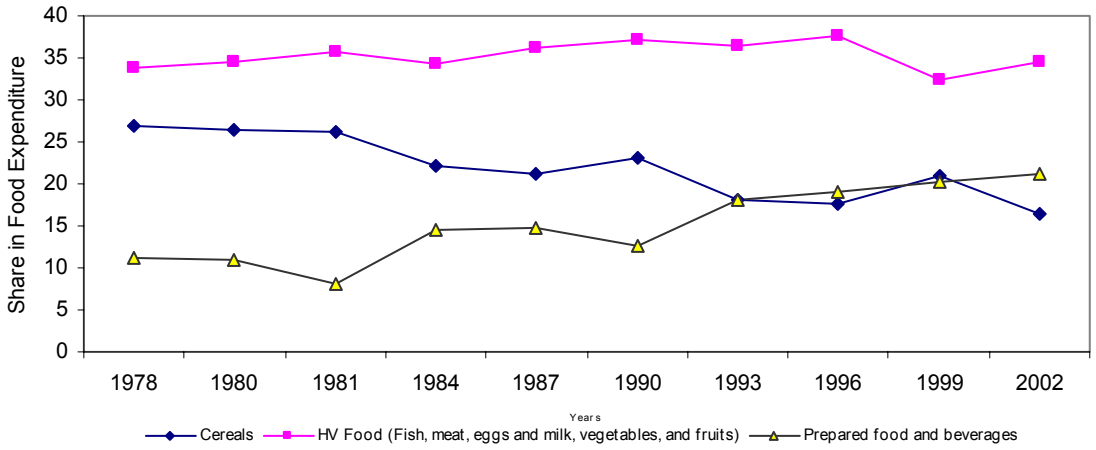
3.1.1 Changes in Lifestyle and Dietary Composition

Starting from 1970, the GDP per capita in Indonesia grew at a rate of above 5% per annum for a period of more than two and half decades and rose from US$298 in 1970 to US$1113 in 1996 (WDI 2003). During this period, urbanization in Indonesia also occurred at a remarkably consistent rate of 5% per annum and the percent of total population living in urban areas doubled from 20% in 1976 to 40% in 1999 (WDI 2003).

This figure is projected to increase to over half the total population by the year 2020 (Edwards et al. 1995).

With rapid increase in income and urbanization, food consumption in Indonesia has shown a pattern of change over the past three decades, from a diet characterized primarily by the staple foods of rice and cassava, to one that includes a larger share of fruits, fish, meats, dairy products and processed foods. Such a diversification in the diet in favor of high value products can normally be seen when economic growth occurs. In particular, the shift is ascribable to increased incomes, greater urbanization, and concomitant lifestyle changes.

Figure 5—Total Food Exp. and Share of Cereals and HV Food (Urban Areas)



Source: Data from CBS, various years. HV food includes fish, meat, eggs and milk, and FFV. The total expenditure on food includes other food items. Therefore the sum of cereals and HV food would not be 100%.

Figure 5 shows the dietary composition of cereals and high value foods as a percentage of total monthly expenditure on food of urban consumers starting from 1978 to 2002. It also includes the total expenditure on food expressed in constant 1993 Rupiah. As expected, there was a continuous shift of food expenditure in favor of high value

foods until the economic crisis in 1996. Note that this shift was accompanied by an increase in total food expenditure. Therefore, the change in urban demand is expected to influence the production of high value products positively. In addition, urban residents tend to spend greater amounts on all categories of food (other than staples) than rural residents, and the difference in expenditure is especially large in the case of meats, dairy and prepared food. Therefore, any increase in urbanization would imply that the aggregate demand for these high value foods would increase.

3.1.2 Relative Profitability

However, an increase in urban demand for high value products is not a sufficient condition that can lead to diversification towards high value products. For this, we need to consider prices and profitability. For this, we consider price and productivity of FFV. In fact, the producers' prices play a fundamental role in determining type and volume of agricultural products. In a given circumstance, whether a producer will produce high value products or not depends on the present and expected prices of high value products and their relative prices. Accordingly, Table A14 in Appendix reports the price trends of selected FFV in local currency per metric ton starting from 1980 to 1995. These are "prices received by farmers" taken from the Food and Agricultural Organization (FAO)'s database. Since these prices are a national average of individual commodities comprising all grades, kinds and varieties, they should be treated with caution. Prices are usually the farm gate price or first-point-of-sale. It is obvious that there was a general increase in the prices of all FFV (Table A14 in Appendix).

Turning to the relative prices, Table A15 in Appendix presents prices of the selected FFV relative to paddy price. We have chosen paddy as a denominator due to its importance in Indonesian agriculture and diets. In contrast to the absolute price increase, which was around 7% or more on an annual basis, the relative prices of FFV compared to paddy did not experience any dramatic increase. In fact, out of eight FFV selected here, four experienced a decline in relative price on an annual basis (the last column of Table A15.

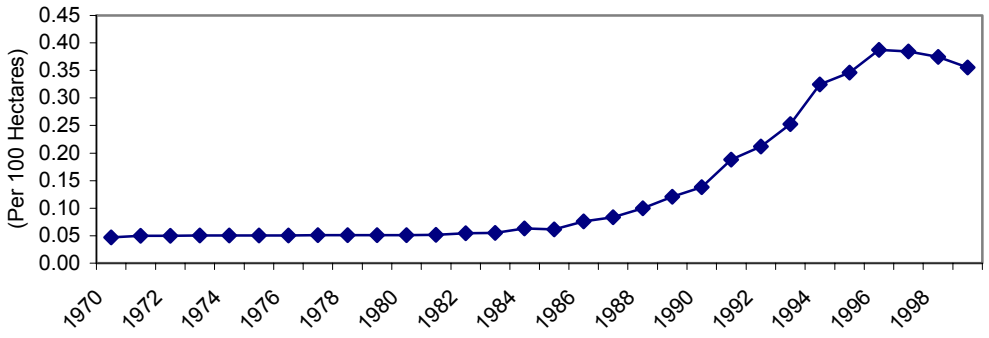
Despite this decline in relative price, the overall profitability in FFV production might have increased due to a rise in productivity. As discussed in Section 2 and shown in Tables A6 and A7 in Appendix, there was a significant increase in the yield per hectare of FFV production and most of the increased production came from the productivity increase.

3.1.3 Rate of Technological Change and Factor Endowments

Given profitability, the other important supply side determinant of high value products is the rate of technical change in agriculture and the factor endowments. Since technological change influences factor's productivity, the rate of technological change and the availability of factors are interlinked. Taking tractors per 100 hectares of arable land as a proxy for technological change in agriculture, it is evident from Figure 6 that until the recent economic crisis, the agricultural mechanization progressed at a rapid pace particularly in the late 80s and early 90s. While in 1970, tractor per 100 hectares of arable land was 0.05, the figure increased to 0.14 in 1990 and to 0.4 in 1996 before the crisis.

Considering the fact that arable land had also increased during this period, this represents a definite move towards mechanization.

Figure 6—Tractors per 100 Hectares of Arable Land



Source: Data from WDI 2003.

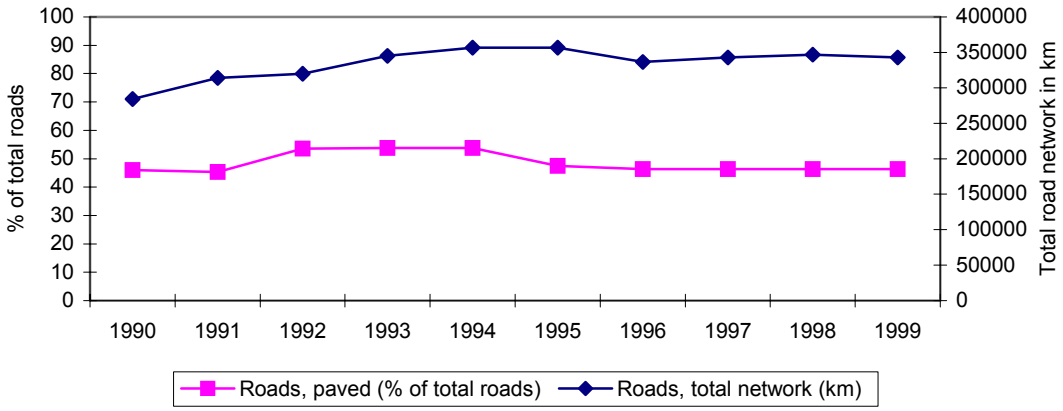
Though not shown in Figure 6, most of the growth in tractors population was due to a rapid increase in the use of two wheels tractors that are mostly used by small farmers. During this time, the total number of two wheels tractor increased from less than one million in 1985 to more than six millions in 1996. And despite the crisis that slowed down the overall mechanization, the number of two wheels tractor continued to grow and reached more than nine millions by 2000 (source: CBS). This mechanization should free the labor from paddy production and lead the way to employ them in the production of labor-intensive high value products such as FFV.

3.1.4 Rural Infrastructure and Institutions

In the production of high value products, rural infrastructure such as availability of rural roads and telephones can play important role. Since many of the high value

products such as fresh fruits and vegetables are perishable in nature, they require expensive storage facilities, reliable communication, and speedy transfer. In the absence of storage facilities as is the case of rural Indonesia, the importance of rural roads and communications increases dramatically.

Figure 7—Road Infrastructure in Indonesia



Data source: WDI (2003).

Figure 7 shows the road infrastructure in Indonesia for the decade of 90s. There are two indicators: first, the total road network in km; second, roads paved as percent of total roads. The first indicator is assumed to capture changes in the total road supply while the second indicator is assumed to capture the changes in quality. It is obvious from Figure 7 that during the decade of 90s, neither the gross supply had increased nor the quality had improved. Though there was an improvement in quality in the early 90s, it fell back and returned to its previous level by mid-90s. Similarly, the total road network had increased in the early-90s before falling back in the late late-90s. However, unlike

roads, there was a major improvement in access to telecommunications: telephone per 1000 people increased from 2.5 in 1980 to 91.7 in 2002 (see Figure A2 in Appendix).

Other factors that can play important roles in diversification towards high value products are institutions such as modern vendors and supermarket. As we will see in the next section, one of the major changes in the retailing industry in Indonesia is the emergence of modern supermarkets. However, data for supermarkets at province level are not available. Therefore, we could not use them in our empirical analysis.

3.2 EMPIRICAL EVIDENCE

To see the impact of different demand side and supply side factors that have influenced the production high value products in Indonesia, we have relied on regression analysis. We have estimated fixed effects model and random effects model in a panel of cross-section time series where province represents cross-section.

Different provinces of Indonesia vary in respect of factor endowments and hence have specialized in the production of different agricultural products. Therefore, we have assumed that the differences across provinces can be captured in the constant term. In addition to fixed effects, we have also estimated a random effects model assuming that the differences among provinces in Indonesia are mere parametric shifts.

3.2.1 Data, Variables and Summary Statistics

To carry out our empirical analysis we have gathered data from CBS (Central Bureau of Statistics, Indonesia). The data set that includes data on all the provinces of Indonesia and covers the time period from 1980 to 2000. Our aim was to construct a

comprehensive data set and accordingly, inclusion of any province was determined by the availability of long-time series data on the variables that are required for our analysis. The data set that we have gathered is tailored to the needs of our empirical framework and contains information on supply side indicators such as relative profitability (relative price), agricultural mechanization (land –tractor ratio), and the state of rural infrastructure (land-rural road ratio). For demand side indicators, we have taken urban consumption demand. Table 1 provides brief summary statistics and Table A16 in Appendix provides summary statistics of all the variables included in the analysis. All the values are expressed in their natural logs.

For dependent variable, we have chosen the yearly province level production area of orange, pineapple and shallot. The production area under individual product is expressed as a ratio of total area under the production of major and non-major agricultural products. Though a proper diversification measure would include a well-constructed index, due to the unavailability of production data of sufficient number of products measured with a common denominator, we have opted for the production of individual product. We have assumed that the production data of high value products is a good proxy of the diversification to high value products.

Our first explanatory variable is the relative profitability measured as a ratio between price of a particular product (e.g., orange price per kg) and price of unhusked rice. All the prices are farm gate prices collected at province level. We have chosen the price of unhusked rice assuming that farmers take their diversification decision to high value products comparing the profitability with paddy production. Besides, the data on

the price of unhusked rice is available most. However, as mentioned in Section 3.1.2, the relative price may not reflect the overall profitability since some important determinants such as productivity and input costs are not included there.

Table 1—Summary Statistics

	# of obs.	Mean	Std. Dev.	Min	Max
Relative Production of:					
Orange	139	-2.782	1.840	-7.515	0.918
Pineapple	140	0.350	1.692	-3.490	4.277
Shallot	115	-5.199	0.773	-7.746	-2.009
Relative Price of:					
Orange	95	1.077	0.724	-1.649	4.590
Pineapple	105	1.241	0.355	0.436	2.335
Shallot	124	1.903	0.524	-0.646	3.172
Urban Consumption Demand (in constant Rupiah)	539	10.324	0.227	8.892	10.924
Agriculture Mechanization (# of tractor/land in hectare)	380	-6.658	1.525	-12.264	-1.828
Rural Infrastructure (road in km/land in hectare)	139	-6.922	1.130	-9.752	-4.142
Economic Crisis	667	0.261	0.439	0.000	1.000

Relative production and prices are relative to rice.
Data Sources: Central Bureau of Statistics (CBS), Indonesia, various years.

The other explanatory variables that we have included in our analysis are urban consumption demand, agricultural mechanization and rural infrastructure. For urban consumption demand, we have taken the yearly consumption in urban area at province expressed in constant Rupiah. For agricultural mechanization we have taken the number of tractors as a ratio of total area in hectares under the production of major and non-major agricultural products. Since the high value products that we are considering here are perishable in nature, we have included the length of rural road as a ratio of land in hectare as a proxy for the development of rural infrastructure. It has been found in other studies that rural road is highly correlated with other rural infrastructure such as electricity and telephone (Chowdhury 2004).

It is obvious from the structural changes described in Section 2 and changes in demand and supply factors described above (3.1.1) that the recent crisis that started in 1996 was a major shock to all the sectors. Therefore, to take this shock into account, we have divided the data into two periods, the period before the economic crisis (from 1980 to 1996), and the period after the economic crisis (from 1997 to 2002).

3.2.2 Results

Table 2 reports the value of the estimated coefficients along with their respective standard errors. Before describing the results, two important caveats of our analysis that need to be mentioned are: first, due to data inadequacy, we could not take any institutional factors, such as the changes in the retailing sector, and the emergence of vertical arrangement in the agriculture, into account. Second, results should be taken with cautions due to limited number of observations and the use of less than perfect proxies.

We start with the impact of price response to the increased supply of FFV. In all three cases and in both models, the relative price is not statistically significant. That means, in the case of FFV that we have examined here, the relative price has not played any positive role. Therefore, the supply of FFV is not due to a price response. However, the overall profitability might have increased nonetheless due to increased productivity.

The factor that appears most important in our analysis is the urban consumption demand. According to the findings, for a 1 per cent increase in urban consumption, the production of FFV increases from 0.8 per cent to 5.1 per cent. However, the magnitude of

the coefficients should be taken with caution due to the small base of some of the products.

Table 2—Determinants of FFV Production, 1980-2000

Dependent Variable: Production at province level

Regressors	**Orange**		**Pineapple**		**Shallot**	
	Fixed Effects	Random Effects	Fixed Effects	Random Effects	Fixed Effects	Random Effects
Relative price	0.611	0.495	0.172	-0.065	0.107	-0.043
	(0.628)	(0.447)	(0.343)	(0.325)	(0.175)	(0.181)
Urban consumption demand	4.989**	4.731**	5.131**	3.609**	0.901*	0.798*
	(2.000)	(1.572)	(1.718)	(1.574)	(0.382)	(0.401)
Agricultural Mechanization	1.572*	0.860**	0.504	0.195	0.082	0.044
	(0.758)	(0.352)	(0.563)	(0.374)	(0.068)	(0.071)
Rural Road	-0.050	0.141	-0.248	-0.307~		
	(0.191)	(0.167)	(0.175)	(0.169)		
Economic Crisis	-0.893~	-0.571*	-0.630	-0.442	0.050	0.072
	(0.470)	(0.332)	(0.403)	(0.338)	(0.135)	(0.145)
Constant	-44.572~	-44.674**	-51.882**	-37.727**	-13.990**	-13.087**
	(22.482)	(15.952)	(18.245)	(16.411)	(4.074)	(4.274)
No. of Observations	48	48	56	56	94	94
Number of Provinces	9	9	10	10	7	7
R-squared						
Within	0.325	0.296	0.2860	0.2641	0.180	0.170
Between	0.289	0.375	0.0007	0.0191	0.780	0.807
Overall	0.266	0.343	0.0193	0.0673	0.001	0.000
Prob>F	0.01		0.01		0.00	
Prob>chi2		0.00		0.02	0.00	0.04

Standard errors are in parentheses. ~ significant at 10%, * significant at 5%, ** significant at 1%.

Unlike relative price, agricultural mechanization has played a positive role to the production of FFV. Though the impact of mechanization is statistically significant only for one product, the coefficient remains positive in all cases and in both models. One possible reason behind this impact is that since the production of FFV is labor intensive compared to traditional agricultural products including cereals, the mechanization in agriculture in general that we discussed in section 3.1.3 has freed labor and contributed positively to the production of FFV.

In contrast to mechanization, rural infrastructure proxied by rural road is not statistically significant. This finding is surprising; given the perishable nature of the high value products and the insufficiency of modern storage facilities particularly in the rural areas, the availability of rural road is a necessary condition to ensure a speedy transfer of products from rural production center to urban consumption center. However, we have seen in section 3.1.4 that paved roads as per cent of total roads have not changed in the 90s. Though it improved in the early 90s, it fell before the crisis and did not recover thereafter. During that period, the total road network expanded only marginally. Therefore, there was hardly any variation in the data to show any significant results. Besides, it is possible that the critical level of road infrastructure was already in place that helped the production of FFV.

The last factor that is of interest is economic crisis, where crisis is captured in a dichotomous variable that takes the value one if the economy was in crisis and zero otherwise. It is obvious from the estimated coefficients that the economic crisis had a negative impact on FFV production, particularly in the case of orange.

Our findings on FFV suggest that the observed diversification of Indonesian agriculture towards the production of FFV in the decades of 80s and 90s is largely a demand-pull diversification. Though agricultural mechanization has played a positive role in this process, it is primarily the demand for FFV in urban areas that has driven the diversification. However, some important factors, such changes in retailing and institutions that might have contributed in the process have not been taken into account.

The finding that the relative price compared to paddy production has not played any significant role in agriculture diversification for the last two decades has important implications for Indonesia. Looking at rice prices in Indonesia over the same period of time, one can see that with the exception of 1988-91 and 1997 and 1998 – the peak years of economic crisis – the domestic price of rice was always higher than the world price by 13% to 70%. Therefore, farmers always had an incentive to increase their rice production. Once we add other incentives such as subsidy in fertilizer, irrigation and credit given by the government of Indonesia for rice production, the overall incentives in favor of rice production becomes pervasive. Therefore the finding that the current diversification is not due to price response conforms to the reality.

Though the recent economic crisis has not affected all the products equally, there was an overall negative impact on diversification. Though we have seen in Section 2 that the share of agriculture in income and employment had increased during and immediately after the economic crisis, the absolute contribution of agriculture had decreased at that time. Despite the increase in export of some high value products (e.g., oil palm) following economic shock, the trend of diversification towards high value products had slowed down.

3.3 TRANSACTION COSTS: CONSTRAINTS TO DIVERSIFICATION

In the previous subsection we have found that despite the increased demand in urban areas, the relative price of high value products to unhusked rice has not played statistically any significant role in determining the production of HVPs. This contradicts with the notion that an upward shift in demand for high value products under lagged supply response results in a higher equilibrium price, which should result in higher profitability. However, this can happen if there is a high transaction cost between the producer of high value products based in rural areas and the consumers of high value products based in urban areas. Under the presence of high transaction costs, a high consumer price may not result in a high farm gate price.

For simplicity, we define transaction cost here as the gap between buying and selling price.[18] Transaction cost is a widely used approach to explain the observed market failures and self-sufficiency in agriculture in developing countries.[19] The existence of transaction cost generates a wedge between a household's buying and selling price, i.e., once adjusted for transaction costs, the price of a high value product can be different depending on whether the household is on the demand or on the supply side of the market. As a result, transaction costs reduce the market size and, in extreme cases, when transaction costs are very high, the market may fail.

To examine the extent of transaction costs measured by the gap between buying and selling prices, we have chosen two sets of prices: a) farm gate price, and b) wholesale

[18] See Hirshleifer (1984), pp. 421-23.
[19] See Key *et al* (2000) for a theoretical analysis and empirical evidence.

price, and compared them within a province and between provinces. Though an ideal measure would take producer and consumer prices into account, due to the unavailability of such prices for the high value products that we considered in our regression analysis, we have opted for the second best. Since the consumer prices in a given location would be higher than the wholesale prices in the same location, our approximation of the transaction costs would be downward biased.

We have computed two sets of price ratio: first, the average farm gate price of a particular product in a province as a percentage of the wholesale price of the same product in the same province. Table 3 presents the price ratios of farm gate price as a percentage of wholesale price. It varies from as low as 52% to as high as 98%. It seems that there is an upward tendency implying that farmers are receiving a higher share of wholesale price in the 1990s than in the 1980s. However, the trend is not obvious since there are exceptions and we have only few data points that limit any generalization further.

The provinces that have been considered in Table 3 are in Java – the island that has the best infrastructure and the largest consumer base in Indonesia. Given that the farmers receive about 70% of the wholesale price on an average, it is obvious that the extent of transaction costs in FFV remain large.[20] As we will see in the next section, the gap between wholesale price and retail price could be as high as 50%. It implies that the

[20] The overall mean is 71.82% and the standard deviation is 13.31%. For potato and orange, the means are 70.53% and 71.82%, and the standard deviations are 12.39% and 15.01%, respectively.

farmers' share in total gross value generated in high value products remain at around 25% to 30%.

Table 3—Farm Gate Price as a % of Wholesale Price in the same Province

	Province	1984	1987	1990	1993	1996	1999
Potato	West Java			70%	60%	71%	
	Central Java	62%	64%	72%	81%	68%	65%
	Yogyakarta	80%		98%	57%		
	East Java		97%	63%	54%	71%	66%
Orange	West Java	61%	52%	66%	60%		
	Central Java	60%	77%	88%	91%		
	Yogyakarta			91%	93%		
	East Java	73%					

Source: Computed from CBS data.

For the second set of price ratio, we have computed the average farm gate price of a particular product in a province as a percentage of the wholesale price of that product in Jakarta. We have taken the wholesale price in Jakarta as a denominator since Jakarta is the largest urban consumption center of high value products in Indonesia. Table A17 in Appendix presents the price ratios for 1984 to 1993.

Two obvious observations to be made are: first, farmers in production centers receive only a part of the wholesale prices that prevail in Jakarta. Second, further a production center is from Jakarta, for instance South Sulawesi or South Kalimantan, the lower the price ratio. This implies that transportation costs and infrastructure are essential to reduce the price gap and increase the profitability of farmers who produce high value products.

The above analysis shows that transaction costs that include marketing margins and transport costs remain very high and up to an extent of 70% of gross value in certain instances. Therefore, to increase the price incentive and relative profitability of farmers that produce high value products, reduction of transaction costs is a must. Such reduction can act as an incentive and can induce further diversification towards high value products.

4. SUPERMARKETS AND VERTICAL ARRANGEMENT IN HVP

In the last section (Section 3) we have seen that one of the major forces that has been influencing the agricultural production is the changes in urban consumption in favor of high value products and prepared foods. Accompanying this change in consumption, there has been a change in retailing in the form of a rapid growth in supermarkets. Evidence on similar settings shows that rise in supermarkets can influencing the production and can pave the way for vertical arrangement in agriculture[22]. The objective of this section is to review the emerging vertical arrangement in agriculture and to review the value chain, and value distribution resulting from vertical arrangement. In addition, we will also review the issue of small farmers' participation in the emerging vertical arrangement.

Though diversification of agriculture towards high value products (HVP) is a national strategy beneficial for the country to reduce its dependence on few commodities and its exposures to external shocks, diversification at national level has important

[22] For instance, see Balsevich et al (2003) and the references therein.

implications at farm level in terms of various risks, particularly, price and production risks. HVP as defined here is perishable in nature and requires a speedy transfer from production centers to consumption centers. In the absence of good infrastructure and institutional links, risks associated with HVP are generally higher than the risks associated with staple crops such as paddy.

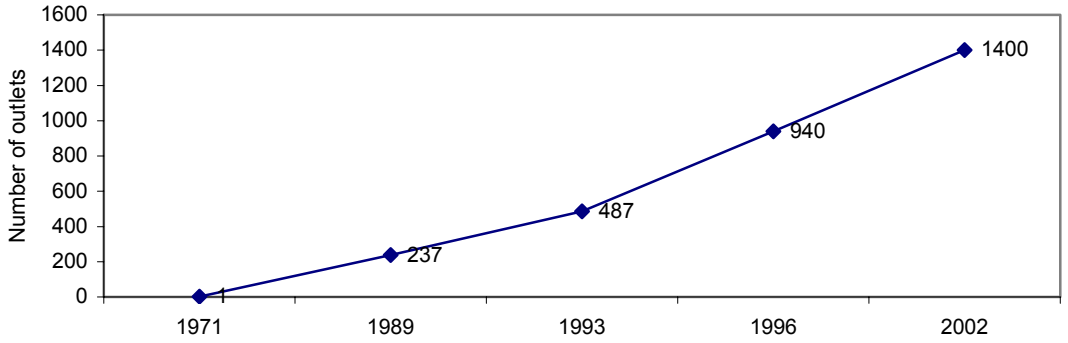
In a typical vertical arrangement, production and marketing decision are partly or entirely taken by the allied industries and today's farmers in Indonesia are getting increasingly more integrated than yesterday's farmers. However, the loss of independence in production and marketing decision at farm level due to vertical arrangement can bring benefits by reducing various risks, constraints and costs that farmers face otherwise. Vertical arrangement can also act as a vehicle for agricultural diversification at national level and commercialization and specialization at farm level.

4.1 EMERGENCE OF SUPERMARKETS AND FAST FOOD CHAINS

We have seen in Section 1 and Section 3 that there have been some major changes in the consumption pattern in Indonesia in favor of high value products, particularly in 1990s. These major changes in consumption have been accompanied by a major change in retailing in the form of growth of modern supermarkets. Figure 8 shows the emergence of supermarkets[23] in Indonesia during the last three decades. It is obvious from Figure 8 that during the decades of 1980s and 1990s, the growth of supermarkets in Indonesia was phenomenal.

[23] Supermarkets here include supermarkets chains and hypermarkets chains.

Figure 8—Number of Supermarket Outlets in Indonesia, 1971-2002



Data Source: Canadian Embassy (2003). Data for 2002 is from Sitathan (2003).

Similarly, Figure A3 in appendix shows the emergence of fast food industry in Indonesia in the decade of late eighties and early nineties. While in 1987 there were only seven fast food companies with a total of 38 outlets in Indonesia, by 1993, the figure reached to 71 companies with a total of 476 outlets. Though supermarkets and fast food chains in Indonesia remain urban centered, they are not limited to Jakarta only. They encompass other cities such as Surabaya, Medan and Bandung and are spilling over to small cities as well (see Box 1). Before the economic crisis, Indonesia had 940 supermarket stores, out of which 627 were located outside Jakarta.[24]

[24] Canadian Embassy. Food and Beverage Retail Report: http://atn-riae.agr.ca/asean/e2987.htm, access date September 13, 2003.

Box 1: HERO SUPERMARKET

PT. Hero Supermarket Tbk. was established in 1971. By the end of 2002, it had 106 outlets in Indonesia covering all major cities in Java, Sumatra, Kalimantan, Sulawesi, and Irian Jaya. Recently, it has also expanded its business to hypermarket, named Giant hypermarket, which has four outlets at present. The annual sales revenue of the company in 2002 was about Rp.2.4 trillion.[a/] This was a marked improvement in performance in post crisis period. It is now in an expansion mode and planning to expand aggressively.

To cater the supply requirement of individual Hero outlet, it maintains a central distribution center. There is a typical procurement pattern that Hero follows for local food procurements: farmers to collectors to bigger collectors to Hero's central distribution center to Hero's outlets.

Though the source of procurement varies depending on location of an outlet, on an average Hero procures more than three quarters of its fruits from abroad, and three-quarters of its vegetables from domestic producers. However, before procuring any product from domestic sources, Hero establishes a relationship with farmers through collectors and conducts strict quality control on on-farm as well as on off-farm activities.

Source: Gumbira-Sa'id (2003b)

Note: [a/] Using exchange rate of Rp.8,400/US$ (as existed in late 2003), the turnover in 2002 was US$285.7 million.

This increasing trend in supermarket and fast food chains in Indonesia is expected to continue for the foreseeable future. In 1998, Indonesia opened up its retail and wholesale trade sector for foreign investment including agricultural product distribution by eliminating past restrictions. Foreign firms now can operate retail outlets in most major urban areas, although restrictions remain in the provinces. Two hypermarket chains that have taken the opportunity of changed regulation are Carrefour and Continent owned by two French parent companies are the early entries of FDI in retailing. Before the riots in 1998, joint ventures with foreign operators were a rising trend, as Indonesian retailers sought technical and managerial expertise from abroad.

With more and more urban consumers visiting supermarkets[25] and with the emergence of more supermarket outlets, it is not a surprise that supermarkets are increasingly becoming an important part and capturing a significant share of the retailing industry. As shown in Figure 9, in 1997, supermarkets had a share of 6.3% of the total retailing industry in terms of value of goods transacted. By 2001, the total share of modern retail industry in total retailing reached to 20.4%.[26] While the modern retailing has been in a rise, the traditional retailing has been in a decline. For instance in Jakarta, the number of traditional retailing markets under the management of Pasar Jaya declined from 164 in 1992 to 162 in 1993.[27]

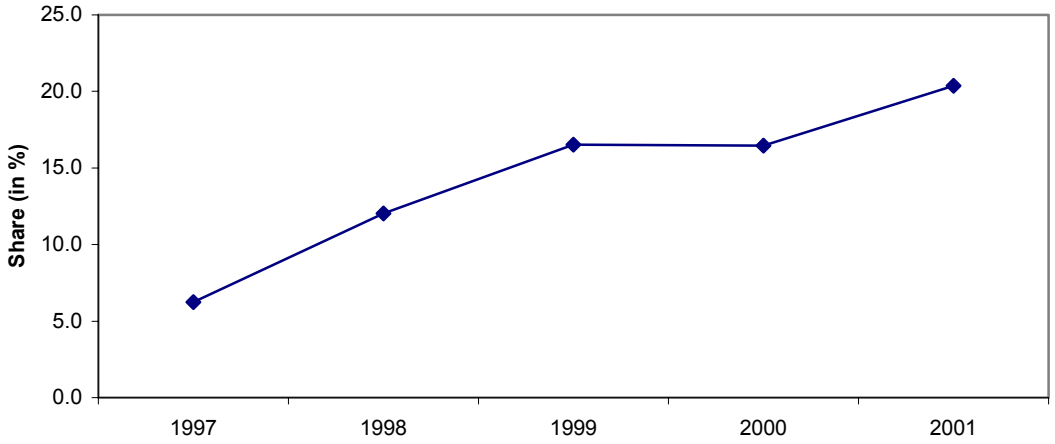
Nonetheless, though the dualism in retailing industry will perhaps continue for the foreseeable future, the role of traditional wet markets, particularly in urban areas, has been rapidly shrinking.

[25] For instance, according to RIRDC (1995), it has been found that while in 1992, 30% of the Jakartans said they had never been in a supermarket, by 1993, the figure dropped to 17%. Similarly in other major cities, such as in Surabaya and Bandung, the proportions of 'non-visitors' dropped from 43% to 36% and from 41% to 23%, respectively

[26] There are other sources that claim a much larger share of modern retailing in total retailing. For instance, according to Mellor et al (2003, p.62), by 2001, hypermarkets accounted for 32% of the national retail markets, while supermarkets accounted for an additional 33%. That means, combing together, the share of modern retail industry in total retailing reached to 65% by 2001. However, the share of supermarkets and hypermarkets in retailing reported in Mellor et al (2003) is questionable and many local and international experts have expressed strong doubt on the very high share of modern markets that Mellor et al (2003) came up with.

[27] RIRDC (1995).

Figure 9—Share of Modern Retail in Total Retail, 1997-2001



Source: PT. Visidata Riset Indonesia, 2003. *Development of Modern Retail in Indonesia* (Hypermarket, Department Store, Supermarket and Minimarket), Jakarta.

4.2 SUPERMARKETS AND VERTICAL ARRANGEMENT

The rapid emergence of supermarkets and fast food chains has led the way for vertical arrangement between agriculture and its allied industries. The process of vertical arrangement can be visualized using the value chain that exists in Indonesia's food markets. Consider a newly established supermarket chain in Jakarta that sells pineapples to the end consumers. In a typical setting without any vertical arrangement, the pineapples that it sells are produced by farmers, sold in spot markets, purchased by middlemen/traders, and sold to a wholesaler who in turn sold them to a retailer. Since the whole value chain involves many nonintegrated agents, without any type of coordination, there are two major problems: first, products, in our case, pineapples, might not be produced in the way that end consumers want since rural farmers based in villages may

lack information about the preference of urban consumers based in cities. Second, there might be high transactions costs due to search involves in each stage of the spot market, and in monitoring and enforcement. In a market characterized by imperfect competition, high transaction cost is not an unlikely outcome.

Therefore, in the present case we consider vertical arrangement as a response to increased demand for high value commodities (Section 3.1.1) such as pineapples and to reduce transactions costs (Section 3.3). Since direct coordination between farmers and supermarkets either through ownership or through contract can reduce information asymmetries that otherwise prevails between urban consumers and rural producers, coordination is a way to meet the changed demand. Since coordination can also reduce the need on behalf of farmers to search for market transactions and associated costs, it is also a way to reduce transaction costs. In addition, this type of arrangement can also induce commercialization and specialization at farm level and diversification at national level.

In fact one can argue that the changing patterns of consumption and forms of retail may have mutually reinforced one another. On the one hand, clearly changing consumption patterns in favor of high value foods demand different forms of retail, and supermarkets have arisen to fill this demand. On the other hand, the emergence of supermarkets has increased the widespread availability of high value foods and increased the consumption of high value foods further. Just as with supermarkets, the rapid spread

of fast food chains in Indonesia is both a consequence of changing food consumption patterns as well as a force that drives the changes in patterns of food consumption.

From a supermarket's perspective, there are two major incentives that motivate vertical arrangement decision: first, transactions costs versus costs of coordinating the same activities in contracts/ownership integration. Second, control on output and value chain. While control on output can deliver the products according to the preference of the end consumers, control on value chain can act as entry barriers for potential competitors and pave the way for monopsony rent. We will come to the implications of controls again once we described the vertical arrangement in the modern value chain that has been emerging in Indonesia.

From farmers' perspective, three major incentives that motivate vertical arrangement are: first, reduction in risks; second, minimization of transaction costs; third, ease of resource constraints. Risk plays a central role on farmers' choice of crops decision and the degree of specialization. Among various risks, two most important are price risk and production risk. Since prices of high value products may vary from season-to-season, and since there is often no price stabilization efforts from the public authority, producers of high value products are subject to higher price risks compared to staple crops. Similar to price risks, producers of high value products are subject to production risks, particularly to yield risks due to variations in inputs, weather and other idiosyncratic risks. Though production risk can be managed at farm level up to a certain extent, it still constitutes a substantial portion of overall risks.

In developed economy where futures and options for agricultural products are available, farmers can use futures as downside price protection or options to capture favorable price movements while ensuring downside price protection. Similarly producers can use production insurance and other risks mitigating instruments that can reduce production risks substantially. However, in the absence of markets for futures and risks as in the case of Indonesia, farmers' specialization decision to high value products is subject to price risks and production risks.

In addition to price and production risks other factors that deter farmers, particularly small farmers to produce high value products are transaction costs related to information costs. Due to the lack of information about products, inputs and markets, farmers often incur high transaction costs related to information. Resource constraints due to limited access to production resources, inputs and credits also play important role in farmers' choice of production portfolio.

In the absence of risks mitigating instruments such as crop insurance and future markets, information asymmetries, resource constraints, and high transaction costs, vertical arrangement between farmers and supermarkets can be a potential solution to achieve diversification towards HVP. In a vertical arrangement where a supermarket shares risks with farmers, provides information, credits and other production inputs, ensures output disposal at a predetermined price can be highly beneficial for farmers' specialization to high value products.

4.3 IMPACTS OF VERTICAL ARRANGEMENT

There are three impacts due to vertical arrangement that we will examine here are: first, the emergence of a new value chain; second, the value distribution among different actors in the value chain; and third, participation of small and marginal farmers in the emerging value chain.

4.3.1 Value Chain in FFV

The emergence of supermarkets and modern retailing in Indonesia has paved the emergence of vertical arrangement between supermarkets and farmers and has influenced the value chain in FFV. It has resulted in more coordination in the value chain starting from production at farm level to quality control at intermediary level to marketing at retail level.

A. Traditional Value Chain[28]

Before describing the emerging value chain and the vertical coordination there, it would be worthwhile to have a brief overview of the traditional value chain that pre-existed and still perpetuates a significant part of the food market in Indonesia.

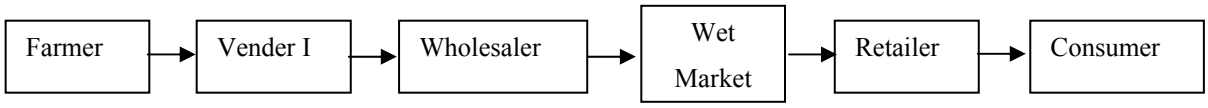


Figure 10—Traditional Value Chain

Figure 10 shows the traditional value chain for fruits and vegetables that has been persisting in Indonesia for a considerable period of time. In a typical setting of a

[28] Information was collected during field visits in East and West Java in September 2003 and January 2004.

traditional value chain, a farmer produces fruits/vegetables for self-consumption and for market with little or no knowledge about grading and standard, and food safety. The part of the products that s/he produces for market sells to a vendor (labeled here as Vender I). The vender could be a village-based collector or a sub-district based collector who in turn sells to a wholesaler. Depending on the production location, there could be an additional vender in between vender I and wholesaler located in district level. Vendors from district or sub-district level either jointly or individually rent transport vehicle and send their products to the wholesale market. Before sending the products, they negotiate the price with wholesalers where negotiation takes place over telephone. The wholesaler in turn sells to the wet market. Traditional retailers buy from wet markets and sell to final consumers.

Traditional vendors based in villages usually extend credit support to farmers during growing seasons. Farmers in turn sell all their products to the vendor where the vendor fixes the price based on the existing market price. Though vendors fix price, since vendors market is very competitive at district and sub-district level due to the existence of numerous vendors, a vendor cannot impose a price well below the market price. For instance, at sub-district level where vendors have direct link with farmers, the number of traditional vendors could be well above 100. In this market, settling at a price well below the prevailing market price is very unlikely.

Though in the traditional value chain, the production risk is partly shared between farmers and vendors, the extent of coverage is limited to the credit. However, vendors themselves are credit constraints. Based on the rapid appraisal survey, we have found that

for traditional vendors, access to formal credit is either absence or involves lengthy procedure of documentations that they cannot fulfill. Therefore, the extent of credit to farmers from vendors is limited. In addition, there is no price-risk sharing. In fact, since vendors are very specialized in their product basket, they cannot insure farmers against price risks due to their (vendors) non-diversified product portfolio.

Depending on location, some wholesale markets in Indonesia appear to be very efficient in respect to price spread. For instance, the wholesaler market for fruits and vegetables in Jakarta seems very efficient in transmitting price information. Due to the existence of numerous wholesalers and due to the dissemination of price information from wholesalers market to venders based in districts and sub-districts relatively quickly, the price spread between wholesalers and venders are at a minimum level. However, we will comeback to this point when we will compare the price spreads between traditional value chain and modern value chain.

B. Modern Value Chain

A typical supermarket outlet such as Hero sells not less than 15000 products of which around 200 would be fruits and another 200 would be vegetables. There is a sharp contrast between fruits and vegetables sources. While almost 80% of vegetables sold in supermarkets are domestically procured, around 80% of fruits sold in supermarkets are imported.[29] However, this import-domestically procured mix is not universal and could vary depending on the location of a supermarket outlet. For instance, a supermarket outlet

[29] Information is collected from Hero officials during a meeting with them by E. Gumbira-Sa'id and Ashok Gulati.

based in Irian Jaya would perhaps import most of its products from Australia while a supermarket outlet based in Batam would import most of its products from Singapore. This import-domestically procured mix can also vary from year-to-year.

Figure 11 shows the modern value chain pertaining to the domestically procured fruits and vegetables. In contrast to the traditional value chain described above, the modern value chain that has been emerging in Indonesian food sector usually contains fewer participants, involves a high degree of coordination, and ensures a high level of integration among different activities.

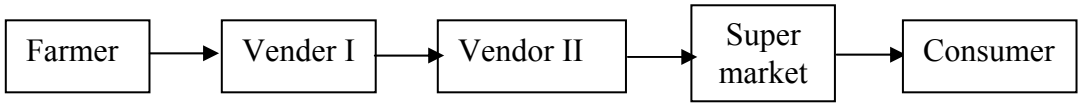


Figure 11— Modern Value Chain

In the modern value chain, a farmer usually establishes a contractual relationship, mostly oral, with a vendor, and the vendor establishes a similar contractual relationship with a supermarket chain. Though there could be two vendors as showed in Figure 11, vendor I - who collects from farmers and supplies to the next stage (vendor II), and vendor II – a relatively bigger collector who supplies directly to the supermarket chains, in some cases, there is only one vendor in between farmers and supermarkets. Individual supermarket outlet does not receive products from vendors. Instead, vendor II supplies to a central distribution system owned by the supermarket chain and it (the central distribution system) in turn supplies to individual outlets.

In contrast to traditional retailing, supermarkets in Indonesia maintain grades and standards in procurement. They supply the guidelines for grades and standards to vendors, and as a part of the supply agreement, vendors need to strictly implement the guideline. For each fruit and vegetable, there is a specific grade and standard requirement and each fruit and vegetable procured locally needs to conform to this grade and standard requirement specified by the supermarkets. To ensure desired quality, supermarket chains usually monitor both on-farm and off-farm activities by controlling fertilizer applications, quality of seeds, harvesting, and post-harvesting handling techniques.

Box 2: SAUNG MIRWAN

Established in 1983 near Bogor, PT. Saung Mirwan produces vegetables and flowers, works as a vendor, and supplies directly to supermarkets' central distribution centers. The vision of the company is to become a leader in agribusiness by producing high quality agricultural products, using proper technologies and establishing partnerships with farmers and other institutions, and developing human resources. In fact, Saung Mirwan is a highly successful case in producing high quality products, partnering with small holders, and promoting women employment in high value agriculture.

The company has its own farm, storage, grading and packing facilities in a single location. At present, Saung Mirwan produces 18 types of flowers and more than 40 types of vegetables in its own farm. The cultivation area is divided into green house and open field. In 1991, the green house area was only about 1.5 Ha; by 2001 it expanded to 3 Ha.

Though Saung Mirwan has its own farm, the bulk of the product that it supplies to supermarkets comes from partnerships. Partnership program at PT. Saung Mirwan started in 1992 involving five traditional farmers near the company site. Later it was expanded to Megamendung (Bogor) and Cisurupan (Garut). At present, 50 partner farmers cultivate vegetables of which 40 of them are smallholders owning an average cultivable area of less than 0.5 hectares. In the partnership, Saung Mirwan supplies production technologies, know how, equipment, seeds, and fertilizers. It also ensures on field monitoring and collects the harvest.

Since 1999, there have been about 265 field workers working at PT. Saung Mirwan consisting of 169 males and 96 females. Female workers are employed in green houses, quality control and packinghouses, and responsible for sorting, grading and packaging. In addition, there are additional 95 female workers who are temporary in nature.

Source: E. Gumbira-Sa'id (2003c)

Vendors play a very important role in the value chain by reducing the information gap that otherwise prevails between supermarkets and farmers (see Box 2). They supply quality seeds, technology and other inputs necessary to attain supermarkets' requirements. They train the farmers on how to achieve the required standards. Some of them also link the farmers to financial institutions and ensure credit availability to farmers. The vendor sets harvesting schedule with the farmers and procures fruits and/or vegetables according to grading and standards agreed upon between the vendor and the farmer.

Vendors also add value to the products through better post-harvest processing and handling starting from cleaning, trimming, sorting, grading, and packaging to distribution. Since quality is the most important attribute for supermarkets, sorting and grading are done by classifying the products according to specific requirements of shapes, colors, taste, odor, and maximum physical defect. The value of products is also added through packaging based on products' characteristics and consumers' preferences. Depending on these, they are packaged in various forms, such as plastic, wrapping film, tray, net, or simply tied up.

4.3.2 Value Distribution

To see who gets how much of the total gross value generated in the chain, data on price spread of different fruits and vegetables has been collected.[30] There are at least two

[30] Our sample includes three supermarket/hypermarket outlets in Jakarta and Bogor, three vendors those who supply to supermarket/hypermarkets from the same areas, and from traditional markets in Bogor and Bandgung.

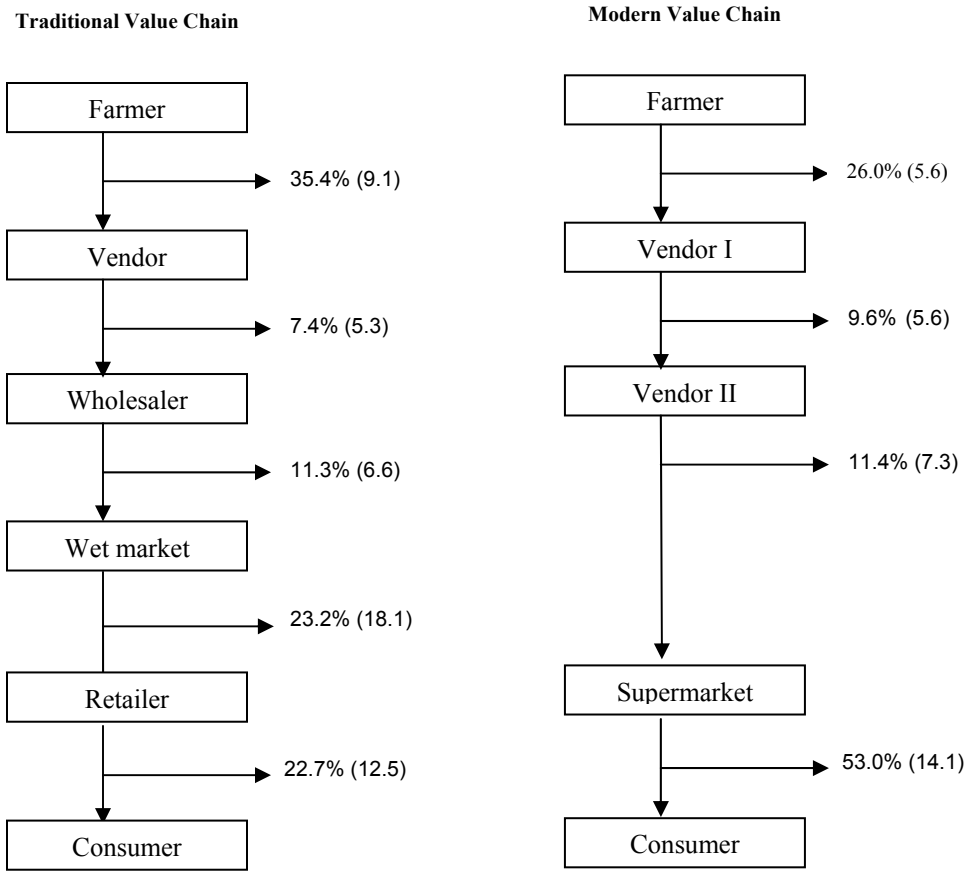
ways of examining the distribution of value generated in the chain among different participants starting from farmers to consumers. First, calculating the percent of gross value that each participant receives in each of the value chains and comparing the participants vertically within a value chain and horizontally between two value chains. Second, comparing the absolute prices between two value chains, particularly for farmers and consumers. However, two essential caveats of the aforementioned exercises are: first, differences in product quality between two value chains, and second, the data that we have collected are not from representative sample.

Figure 12 shows the distribution of gross value as a percent of total within each value chain. This figure is a combination of Figure 10 and Figure 11 depicted earlier to represent traditional value chain and modern value chain, respectively. The numbers on the right side of each of the chain show the distribution of gross value within each chain. These values are based on average prices of six vegetables: cabbage, carrot, chilli, potato, shallot, and tomato collected at each level of transaction starting from farmers to retailers. The numbers in parenthesis show the respective standard deviations.

To explain the value distribution shown in Figure 12, we take a simple example pertinent to the modern value chain. We assume that a consumer bought one Kg of HVP from a supermarket. Now, if the price paid at the supermarket was Rp.100, the farmer who produced that HVP sold it to a vendor (Vendor I) for Rp.26, who (the vendor) in turn sold it to a large vendor (Vendor II) for Rp.35.6 (price that the Vendor I paid to the farmer and Vendor I's gross margin), and the large vendor sold to a supermarket chain for Rp.47 (price that the vendor II paid to Vendor I and Vendor II's gross margin).

Finally the supermarket sold the product to the final consumer for Rp.100 (price that the supermarket paid to Vendor II and supermarket's gross margin).

Figure 12—Distribution of Gross Value (in %) in Traditional and Modern Chains



Data Source: Gumbira-Sa'id (2003b). Numbers in parenthesis are the standard deviations.

Figure 12 gives scopes for a vertical analysis within a chain as well as a horizontal analysis between chains. For instance, in terms of vertical distribution in the traditional value chain, 35.4% of the gross value goes to farmers, 7.4% goes to vendors, 11.3% goes to wholesalers, 23.2% goes to wet markets, and the rest 22.7% goes to traditional retailers. Therefore, after the farmer, it is the wet market that appropriates the highest amount of value in the traditional chain. However, compared to traditional value chain, the relative distribution is very different in the modern value chain where farmers receive only 26% of the total gross value and supermarkets receive 53% of the total gross value.

Interesting to note that though vendors in the modern value chain play a crucial role by providing information, inputs and technology, credit and marketing services to farmers and thus reducing production risks and price risks, their relative share is not very different from traditional vendors. It is surprising given that modern vendors have higher investment in human and physical capital compared to their traditional counterparts. One possible explanation is that though investment requirements is high, unlike traditional vendors who have numerous buyers (traditional wholesalers in present case) modern vendors operate in an oligopolistic market (supermarkets) that makes the distribution of value in favor of supermarkets.

Though it is obvious from Figure 12 that farmers in traditional value chain on an average receive a higher share compared to farmers in modern value chain, and the relatively low standard deviations in all cases support this, the absolute prices that they receive give reverse picture. Table 4 shows the prices received by farmers in traditional

and modern value chains for the same categories of vegetables that have been used to derive the value distribution in Figure 12. As can be seen in Table 4, with the exception of tomato, prices received by farmers linked to the modern value chain for each of the vegetables is much higher than the prices received for the same vegetable by farmers linked to the traditional value chain. On an average, traditional farmers receive a price that is 30.2% less than the price received by their modern counterparts.

Table 4—Absolute Prices Received by Farmers in Traditional and Modern Value Chains

	Traditional	Modern	Traditional/Modern
Cabbage (kg)	0.07	0.27	25.9%
Carrots (kg)	0.13	0.27	48.1%
Chili Pepper (kg)	0.24	0.37	64.9%
Potato (kg)	0.19	0.25	76.0%
Shallots (kg)	0.31	0.37	83.8%
Tomato (kg)	0.18	0.15	120.0%
Average			69.8%

Source: Primary (E Gumbira Sa'id 2003b).

It is important to remind that we have not considered the quality difference in products produced by the two groups of farmers. On the one hand, if the quality comes at a cost higher than the increase in gross margin, the actual welfare of farmers due to integration with supermarkets may not be higher than the nonintegrated farmers. On the other hand, unlike traditional markets, supermarkets link the integrated farmers with consumers who are ready to pay for quality. Therefore, the net welfare gain or loss requires more cautious analysis.

However, there are two other important aspects that our analysis has not taken into account. First: since integrated farmers receive inputs and technical supports from

modern vendors, there is a definite reduction in production risks due to integration. Similarly, since modern vendors buy their (integrated farmers) products at a price correlated to prices in supermarkets, it is very likely that integrated farmers face less price fluctuations than their traditional counterparts. Second, integrated farmers face lower transaction costs compared to their traditional counterparts. Since integrated farmers know their buyers, there is no search involved in finding buyers. In addition, they also incur low monitoring and enforcement costs due to repeated transactions with same vendor (s). Therefore, a reduction in price and production risks, and transaction costs due to integration may have enhanced the overall return to farmers linked to the modern value chain.

Turning to the two groups of consumers, one that buy from traditional retailing and the other that buy from modern retailing, it is obvious that the later group pays a much higher price compared to the former group. However, this price difference is not due to information asymmetry between these two groups. Most important reasons are perhaps difference in product quality, hygiene and safety, and convenience.

It is obvious that the vertical arrangement between farms and supermarkets that has been emerging in Indonesia gives a scope for supermarkets to extract excessive rent due to supermarkets monopsony position and control in the modern value chain. However, supermarkets may incur substantial amount of investment in the value chain and we do not know the size of exact rent.

4.3.3 Smallholders' Participation

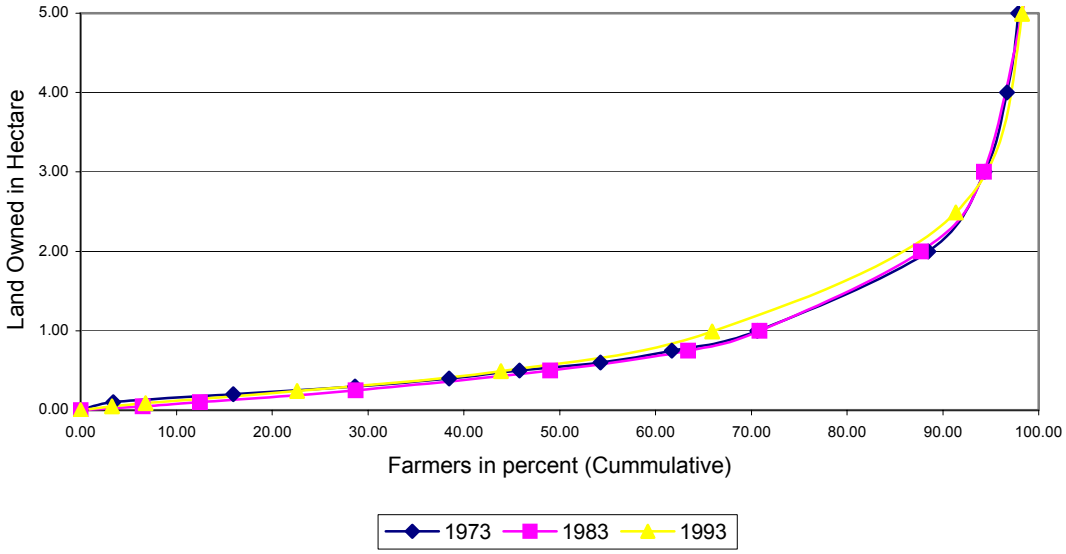
One of the major concerns associated with the emergence of supermarkets in developing countries is the participation of small farmers.[31] Indonesia is dominated by the presence of smallholders. Figure 13 shows the cumulative distribution of land controlled by farmers in 1973, 1983 and 1993 based on agriculture census. Though compared to landholding size in 1970s and 1980s, landholding size has improved in the 1990s, farmers in Indonesia remain predominantly small. According to 1993 agriculture census, around 44% of the farmers had a landholding of 0.5 hectare or less, and 66% of the farmers had a landholding of 1 hectare or less. In the case of Java, the largest source of horticultural products and the highest concentration of supermarkets, the landholding size is even smaller compared to the country average. For instance, in 1993, more than 63% of the farmers had a landholding of less than 0.5 hectare and around 87% of the farmers had a landholding of less than 1 hectare. Given the dominance of smallholders, their participation in the emerging value chain can have great consequences for Indonesia.

To examine this, we have collected information from all the agents involved in the modern value chain starting from farmers to supermarkets. Based on our interviews, case study on Saung Mirwan, and our rapid rural appraisal in West Java, it is found that unlike Latin America as found in Balsevich et al (2003), smallholders in Indonesia are integrated into the modern value chain. However, their integration depends largely on

[31] See, for instance, Cacho (2003). Balsevich et al (2003, p.1149) found that in Costa Rica, 80% of the volume of FFV comes from medium and large grower/packers.

vendors as depicted by the case of Saung Mirwan (Box 2). In addition, they face considerable difficulties in ensuring credit and attaining technical know-how on new products and cultivation methods.

Figure 13—Cumulative Distribution of Land Controlled by Farmers in Indonesia



Source: CBS, Agriculture Census of 1973, 1983, and 1993.

4.4 VERTICAL ARRANGEMENT: CONSTRAINTS AND FUTURE

From public policy perspective, vertical arrangement between farms and supermarkets and other forms of arrangements that have been emerging in Indonesia (and in other developing countries) have been providing services to farmers that were previously provided or expected to be provided by public agencies. Therefore, private firms by providing 'public' services are saving scarce public resources that could be

utilized in the provision of other public goods such as rural infrastructure and agriculture research.

It is obvious that in case of Indonesia, it is the modern vendors who are the closest agents to farmers and they are playing a critical role in the reduction of price and production risks, and transactions costs. Therefore, public authorities need to design incentives for modern vendors. In addition public authorities also need to ensure that small farmers are integrated in this emerging value chain. Minot (1986) argues that small-scale production of many high-value commercial crops, such FFV can be competitive with large-scale production. This implies that there may not be any economies of scale involved in the production of high value crops such as fruits and vegetables that acts as a constraint to small-scale farmers.

Evidence based on case studies and rapid rural appraisal in West Java has shown that small holders are equally competitive and participating in the emerging vertical arrangement through modern vendors. However, though small holders in the case of Indonesia are producing HVP, one of the major constraints that they have been facing is credit. Since smallholders do not have access to formal credit such as commercial banks, they are highly credit constrained and often pay much higher interest rates in the informal market than the rate prevails in the formal market.

It should be mentioned that vertical arrangement between farms and firms is not necessary for all agricultural products. The scope of arrangement is product specific and the contracting relationship between firms and farms is not necessary for all kind of agricultural products. In the case of staple crops such as paddy where efficient spot

market exists and the products are not perishable, there is no need for vertical arrangement. Since arrangement involves costs both for farms and firms, any potential reduction of transaction costs and risks need to be weighed against costs incurred due to arrangement either through contract or through ownership.

Supermarkets are a challenge to traditional retailing as more and more consumers are choosing them over traditional retailing. However this does not call for any restriction on supermarkets. Government needs to oversee if there is any unfair practice carried by any supermarket that undermines competition. The adjustment in retailing industry may require appropriately designed transfer programs for traditional retailers.

For private investors, there is a big scope to invest in distribution infrastructure. In an archipelago as large and diverse as Indonesia, with more than 14,000 islands, an efficient distribution of fresh fruits and vegetables (FFV) is extremely difficult to build. Not surprisingly, Indonesian retailers vary in their distribution capacity of FFV. Modern storage and distribution capacity is scarce. Although trucking remains the preferred means of distribution, the availability of refrigerated trucks is very limited (DFAT 2003). As a result, a modern collection and distribution system for fresh fruits and vegetables remains a major constraint for further internal and external market development for FFV.

5. CONCLUSIONS AND POLICY IMPLICATIONS

In this paper we have looked at three interlinked issues – the extent of structural changes and the state of high value products in Indonesian agriculture, the driving forces behind the growth of high value products, and the state and nature of vertical arrangement in the food supply chain starting from farms to supermarkets.

Evidence presented in this study shows that during the last three decades, there has been a significant structural change in Indonesian agriculture in terms of its relative contribution to income and employment and the composition of different sub sectors within agriculture. The production of high value products that we have examined in this study –estate crops, livestock, fisheries, fruits and vegetables, and floriculture – has grown faster than the cereals. However, the extent of diversification towards high value products has remained limited to few regions and to few products within each sub sector. Production in some sub sector such as inland fisheries has been stagnant, the productivity in some estate crops has been eroding, and in fruits and vegetables the productivity is lagging behind other developing countries.

Factors that have contributed most in diversification towards high value products are the rapid growth in income and accompanied changes in urban consumption in favor of high value products and agricultural mechanization. The relative prices in the production of high value products compared to paddy are either negative or insignificant and do not seem to have played any role in diversification. In addition, the transaction

costs and marketing margin in high value products have remained substantial and have deterred farmers' diversification decision towards high value products.

The economic crisis that was triggered by the currency crisis has resulted in sharp depreciation of Rupiah against foreign currencies, particularly US$. Economic crisis, combining with political chaos, has had a long impact on agriculture sector. It affected the performance of the sector through a change in production costs due to a change in the prices of traded inputs and the relative prices of non-traded inputs, output prices, and agribusiness profits, among others. However, the impact of crisis varied by sub sectors, and products within each sub sector, having both positive and negative impacts depending on the changed incentive structure.

Structural changes in Indonesian agriculture have been accompanied by changes in consumption pattern in urban areas in favor of high value products and by a major change in retailing in the form of growth of modern supermarkets. To cater the demand of changed urban consumption needs, supermarkets have been integrating with farmers through formal and information contracts. This vertical arrangement between farms and supermarkets that has been emerging in Indonesia has been helpful to follow grades and standards, to improve quality, and to reduce transaction costs and information asymmetries. It has also been helpful to reduce price and production risks at farm level and to ensure a higher price for farmers compared to traditional value chain. However, it seems that the participation of small holders in the vertical arrangement depends largely on vendors.

Policy implications:

- ***Rural infrastructure should get a high priority***

Among the supply side factors that we examined here, one of the surprising finding was insignificant role of rural infrastructure in the production of high value products. This is largely due to low investment in rural infrastructure during 90s. Therefore, rural infrastructure such as rural roads should be priority area for future public investment. Since rural infrastructures are pro-poor and pro-small holders and they can also influence the production of HVP positively, the public authority in Indonesia needs to invest in rural infrastructures.

- ***Provide user right of state-owned estates to smallholders***

One of the important ways to improve smallholders' asset base is to increase their landholding size. The provision of use right of state-owned estates to smallholders can achieve this. Since smallholders involved in estate crops production such as oil palm are competitive in respect to productivity, giving them use right will not decrease efficiency while it will increase equity. However, such policy move can have some political backlash and may send wrong signals to large private investors that policy makers need to consider before implementing.

- ***Finance modern vendors to finance and integrate small holders in vertical arrangement***

One of the major constraints that smallholders face in the production of HVPs is credit. Due to information asymmetries and high transaction costs, commercial banks are not willing to finance smallholders. However, financing modern vendors to finance smallholders can ease the credit constraints that smallholders face otherwise. Such finance can be arranged either through private banks or through specialized public banks putting a ceiling on interest rate that vendors would be allowed to charge to the farmers.

- ***Promote public-private partnerships to facilitate smallholders participation***

To promote small holders participation in high value products, promotion of modern traders (Vendor I and Vendor II in Section 4) through training in grades and standards, and product quality and product safety can be a vehicle. Such training can be arranged under public-private partnerships between public authorities and private traders and retailers' organizations. For small holders, traders are the closest agents. Therefore, increasing the number of modern traders through training the existing traditional traders can facilitate smallholders' arrangement in the emerging value chain. It can also reduce information gap and incentive problem that exist at present. One problem of selling to traditional traders is that market information does not pass from consumers to farmers immediately. In addition, when farmers trade with traditional traders, farmers do not get sufficient reward for improved quality and as a result they do not have the incentive to improve the quality of their products.

- ***Vertical Arrangement and G&S should be further encouraged***

The recent experiences suggest that the vertical arrangement can be used as an innovative mechanism to improve agricultural competitiveness by enabling agricultural institutions conducive to efficient transactions. The ability to respond to a changed demand of urban consumers at home and consumers abroad depends on how efficient the vertical arrangement from upstream to downstream areas of agriculture. The attribute of a final product is the result of actions taken by different actors starting from seed production to retailing. Therefore, to achieve this, it is necessary to develop efficient coordination through the development of institutions, partnerships, and contracts.

- ***Benefits of super/hypermarkets should be maximized while concerns should be handled carefully***

Since supermarkets are highly engaged in promoting coordination, imposing grades and standards, and improving food safety and food quality, they should be encouraged to do so further. The vertical arrangement can pave the way for tractability and the emergence of grades and standards, and food quality and safety can pave the way for sanitary and phytosanitary standards (SPS). All these can increase the export opportunities for HVPs.

However, there are concerns such as anti competitive practices by large retail chains that can increase market concentration and harm both the farmers and the consumers. Therefore, supermarkets and modern retail chains should be brought under general competition law and regulatory oversight.

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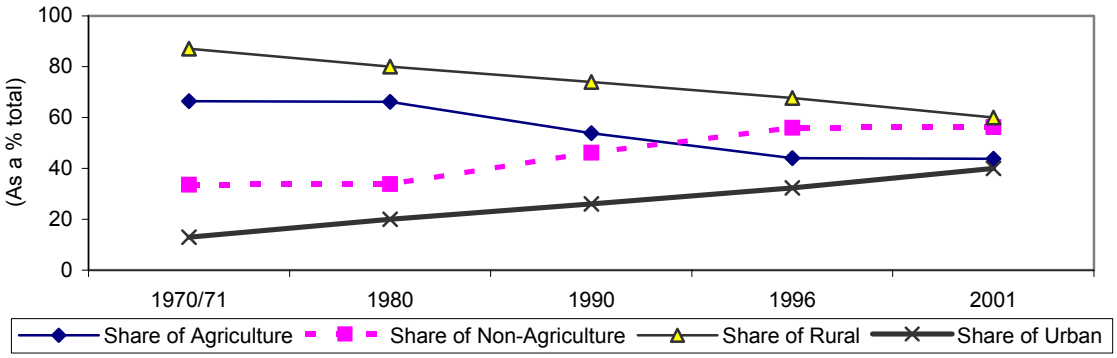
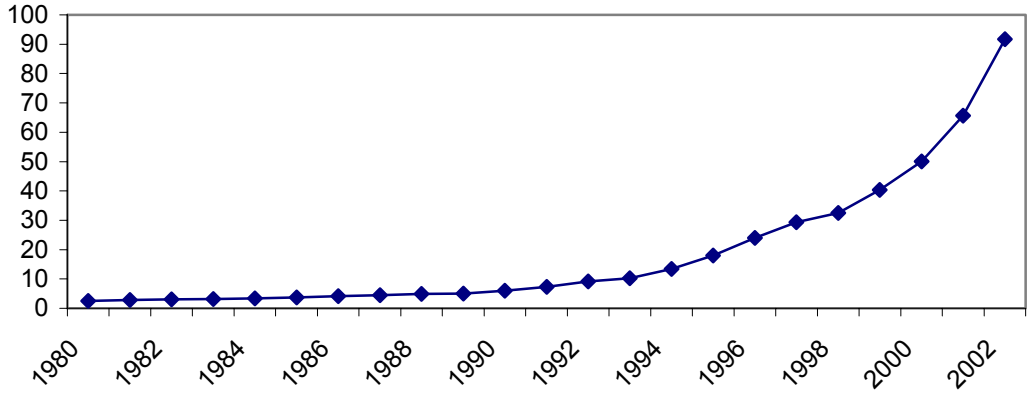
APPENDIX

Figure A1—Share of Agriculture and Rural Employment in Total Employment



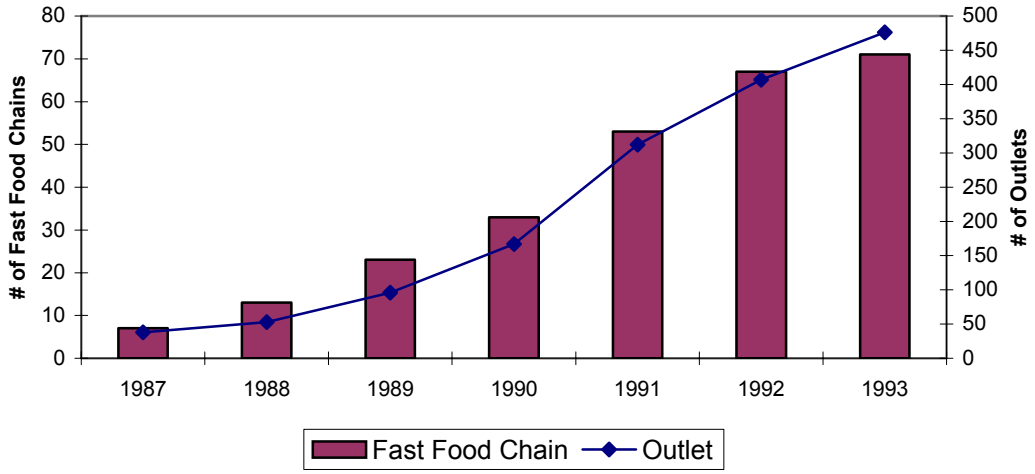
Source: CBS National Labor Force Surveys.

Figure A2—Telephone (fixed + mobile) per 1000 people



Source: Data from WDI 2004.

Figure A3—Fast Food Industry, 1987-93



Source: Data from RIRDC (1995).

Table A1—Annual Average Production of Estate Crops (in Mt): 1970-2002

	1970	1971-1980	1980	1981-1990	1990	1991-1995	1996-2000	2000	2002**
Rubber	801936	861107	1020000	1085811	1275295	1454957	1578859	1501428	1630080
Sugar Cane	676600	832120	366830	426125	654842	659051	776825	904639	744266
Palm Oil	386916	614753	996697	1625854	2420126	3273301	4903685	6117583	6458691
Cacao	197097	387943	902346	1474971	1653970	1661168	1066588	848087	943068
Coffee	15002	16595	18678	23877	28303	28584	35583	39678	40299
Coconut	4039	15580	37117	123770	410688	754101	1545427	2071337	2323666
Pepper	0	8	23	24	49	102	81	124	164
Cashew Nut	n.a.	18	4	41	82	150	631	439	446

Source: CBS.

Table A2—Productivity in Estate Crops, 1971-2002

		1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-02
Cashew Nut	Private	0.00	0.34	0.01	0.05	0.03	0.07	0.04
	Small Holder	0.34	0.10	0.10	0.10	0.17	0.15	0.14
	State	0.01	0.01					
Cocoa	Private	0.15	0.08	0.28	0.39	0.29	0.37	0.41
	Small Holder	0.10	0.17	0.17	0.27	0.47	0.66	0.56
	State	0.19	0.35	0.55	0.49	0.59	0.64	0.67
Coconut	Private	0.35	0.48	0.34	0.32	0.30	0.80	1.13
	Small Holder	0.65	0.64	0.60	0.67	0.72	0.77	0.85
	State	0.32	0.33	0.25	0.73	0.59	0.75	0.76
Coffee	Private	0.34	0.27	0.31	0.38	0.36	0.37	0.37
	Small Holder	0.42	0.43	0.36	0.38	0.38	0.42	0.44
	State	0.44	0.52	0.58	0.63	0.65	0.65	0.61
Palm Oil	Private	1.59	2.13	2.60	1.94	1.81	1.77	1.68
	Small Holder		0.18	0.22	0.83	1.36	1.56	1.82
	State	2.05	2.31	2.57	3.00	3.84	3.82	3.70
Pepper	Private	1.00	0.09	0.25	0.44	0.24	0.25	0.51
	Small Holder	0.56	0.64	0.54	0.56	0.47	0.45	0.42
	State							
Rubber	Private	0.40	0.46	1.02	0.61	0.60	0.70	0.78
	Small Holder	0.31	0.34	0.31	0.34	0.38	0.40	0.43
	State	0.63	0.85	0.89	0.78	0.75	0.82	0.87
Sugar Cane	Private	13.69	4.66	4.91	5.75	5.65	5.60	6.66
	Small Holder	3.38	3.58	4.79	6.53	5.96	4.63	4.86
	State	9.76	7.33	4.61	4.24	4.23	3.82	3.85

Source: CBS, various years.

Table A3—Beef Cattle, Poultry, and Small Animal Population in Indonesia 1985 – 2001, by Region (Moving Average)

Region	Animal Population (Heads)			
	1985	1990	1995	2001
Sumatra				
1. Beef Cattle	1,445,495	1,838,841	2,555,194	2,564,526
2. Water Buffalo	1,106,926	1,129,488	1,261,340	1,203,035
3. Broiler (1000)	52,946	83,876	105,115	105,511
4. N. Chicken (1000)	25,788	55,295	78,987	89,783
5. Small Ruminant	2,147,933	2,663,045	3,673,300	3,694,408
6. Pigs	1,431,105	2,206,262	1,505,501	1,342,804
Java				
1. Beef Cattle	4,206,885	4,514,418	4,971,667	4,505,641
2. Water Buffalo	1,030,630	988,572	923,297	514,873
3. Broiler (1000 heads)	96,674	162,481	401,597	435,994
4. N. Chicken (1000 heads)	73,865	92,773	107,867	103,298
5. Small Ruminant	10,184,736	12,049,982	13,882,890	13,863,558
6. Pigs	279,624	278,348	254,865	159,640
Kalimantan				
1. Beef Cattle	226,396	331,197	436,524	393,966
2. Water Buffalo	72,619	81,379	84,978	67,382
3. Broiler (1000 heads)	9,059	45,371	36,712	41,851
4. N. Chicken (1000 heads)	9,806	11,203	14,792	15,965
5. Small Ruminant	178,806	180,736	253,899	201,638
6. Pigs	819,679	824,618	1,179,541	659,508
Sulawesi				
1. Beef Cattle	1,795,737	2,056,781	1,608,290	1,401,622
2. Water Buffalo	576,245	587,472	361,895	209,492
3. Broiler (1000 heads)	5,351	8,167	31,612	24,141
4. N. Chicken (1000 heads)	20,902	25,565	25,685	27,279
5. Small Ruminant	877,159	1,307,725	772,998	830,658
6. Pigs	674,555	872,391	1,274,134	728,238
Bali & N. Tenggara				
1. Beef Cattle	1,309,310	1,483,612	1,712,242	1,411,373
2. Water Buffalo	402,719	412,261	416,691	294,698
3. Broiler (1000 heads)	5,711	12,474	16,954	21,422
4. N. Chicken (1000 heads)	10,279	13,797	19,213	17,973
5. Small Ruminant	793,317	951,037	1,180,594	777,191
6. Pigs	1,676,770	2,123,696	2,640,321	1,934,587
Indonesia				
1. Beef Cattle	9,110,983	10,410,207	11,572,460	10,572,927
2. Water Buffalo	3,245,459	3,335,079	3,135,542	2,391,595
3. Broiler (1000 heads)	143,657	326,612	689.467	632,871
4. N. Chicken (1000 heads)	156,829	201,366	250.081	268,039
5. Small Ruminant	14,484,523	17,303,598	20,335,118	19,865,006
6. Pigs	5,700,375	7,135,643	7,720,156	5,369,325

Source: DGLPS, Statistical Book on Livestock, Indonesia, 1988 – 2002.

Table A4—Fisheries Production (in million Mt) by Sub Sectors

Sub sector:	1970	1971-80	1980	1981-90	1990	1991-95	1996-99
1. Marine Fisheries	0.807	1.067	1.395	1.887	2.370	2.898	3.601
2. Inland Fisheries	0.421	0.415	0.455	0.619	0.792	0.895	1.000
a. Inland Open Water	0.287	0.256	0.254	0.275	0.293	0.314	0.314
b. Culture:							
i. Brackish water Pond	0.056	0.077	0.098	0.182	0.287	0.345	0.385
ii. Freshwater Pond	0.051	0.056	0.066	0.091	0.121	0.134	0.175
ii. Cage	0.003	0.001	0.001	0.002	0.004	0.023	0.030
v. Paddy Field	0.024	0.025	0.035	0.069	0.088	0.080	0.095
Total Culture (i+ii+iii+iv)	0.135	0.159	0.200	0.344	0.500	0.581	0.686
Total (1+a+b)	1.229	1.482	1.850	2.506	3.162	3.793	4.600

Source: CBS.

Table A5—Average Annual Production and Growth of Selected Fruits and Vegetables

Product		Year	Production (in 1000 Mt.)			Average Growth (in %)			
			1986-1990	1991-1995	1996-2000	1986-1990	1991-1995	1996-2000	1986-2000
Fruits	Bananas		2303	2932	3276	5.50	9.91	0.35	5.25
	Mangoes		481	629	835	5.15	14.94	5.18	8.42
	Oranges		429	481	612	-9.54	44.71	-6.16	9.67
	Papayas		331	428	422	6.92	13.16	-3.46	5.54
	Pineapples		339	452	385	11.88	19.45	-9.19	7.38
Vegetables	Cabbages		939	1355	1646	11.15	13.21	-3.60	6.92
	Chili Pepper (Green)		452	624	940	5.34	75.45	-6.74	24.68
	Potatoes		484	790	964	12.38	11.77	0.31	8.15
	Tomatoes		198	329	551	6.06	31.79	-0.86	12.33

Data Source: FAO Stat. Chili Pepper had some abnormal fluctuations between 1991 and 1995.

Table A6—Area under Selected Fruits and Vegetables (in Hectare): 1970-2000

		1970-1975	1976-1980	1981-1985	1986-1990	1991-1995	1996-2000	Avg. Growth (%) 1970-2000
Fruits	Mangoes	53300	73436	87000	110838	150966	161764	7.05
	Oranges	30683	33477	60010	67443	64413	111369	7.45
	Papayas	31383	22636	30935	31674	32244	34199	2.05
	Pineapples	22517	27068	44788	46903	46862	40865	8.35
Vegetables	Cabbages	18238	26140	38487	62783	65791	96134	9.52
	Chilies &Peppers, Green	103329	106899	181734	235086	178671	172931	4.06
	Potatoes	17393	22902	29305	38357	51608	64205	7.62
	Tomatoes	11909	18584	34427	54255	46752	46392	7.24

Data Source: FAO Stat.

Table A7—Average Yield of Selected Fruits and Vegetables Products (in Kg/Ha): 1970-2000

		1970-75	1976-80	1981-85	1986-90	1991-95	1996-2000	Avg. Growth (%) 1970-2000
Fruits	Mangoes	6342	3857	4683	4364	4135	5119	2.36
	Oranges	4828	6441	7920	6168	7133	5508	3.91
	Papayas	8716	11274	8963	10625	13263	12335	2.26
	Pineapples	4853	6384	7194	7233	9473	9395	2.76
Vegetables	Cabbages	11055	11660	12155	16081	20579	17136	2.42
	Chilies &Peppers, Green	2353	1968	1627	1945	3460	5431	14.10
	Potatoes	6935	9331	9170	12536	15146	15102	4.14
	Tomatoes	3154	4954	3611	3804	6948	11870	11.03

Data Source: FAO Stat.

Table A8—Yield Comparison of Fruits and Vegetables (in Kg/Ha) in 2000

Country	Bananas	Cabbages	Chilies & Peppers, Green	Mangoes	Oranges	Papayas	Pineapples	Potatoes	Tomatoes
Australia	19915	38249	17702	5076	19172	12254	49444	28453	49702
China	19118	18110	18752	11510	10720	29121	22927	14036	25680
India	33688	22692	9091	7095	23077	10000	14571	18443	16152
Indonesia	13147	15560	5405	5309	6441	12302	9364	13376	13124
Malaysia	20725	34307	0	3820	6000	10000	12708	n.a.	17544
Philippines	15007	11415	3526	6340	5622	12399	36296	12280	8873
Thailand	12963	11022	14000	6052	18056	12143	23510	12992	22581
USA	22257	23650	24039	4348	35841	37075	38337	42707	69194
World	16057	20727	13425	7487	18128	15792	19246	16395	27552

Data Source: FAO Stat; n.a.: not available.

Table A9—Export Import Value of Estate Crops (in 000 US$)

Commodity		1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-02
Rubber	Export	310,753	787,043	787,670	953,431	1,243,369	1,250,119	911,881
	Import	0	180	387	381	3,543	10,832	8,815
Coconut	Export	24,415	43,600	59,730	104,243	168,125	307,362	186,925
	Import	83,388	158,955	0	5	11,163	9,223	416
Palm Oil	Export	92,993	197,414	123,917	242,854	679,492	1,106,055	1,788,475
	Import	0	0	14,066	84,245	63,662	27,866	3,704
Cocoa	Export	1,357	11,367	37,097	84,306	221,681	412,206	494,272
	Import	117	2,356	4,107	774	4,852	13,489	54,941
Coffee	Export	78,703	519,674	387,273	554,979	461,105	496,982	206,205
	Import	104	386	251	193	1,071	6,591	4,706
Pepper	Export	24,483	55,467	57,393	124,363	81,687	172,651	95,165
	Import	6	18	31	23	40	4,693	4,210
Sugar	Export	7,346	11,288	21,319	31,322	39,846	13,438	7,599
	Import	13,690	158,955	253,047	62,553	87,564	339,677	272,582
Cashew Nut	Export	0	443	2,183	7,825	27,454	30,582	31,870
	Import	0	0	0	0	241	208	192
Total	Export	540,049	1,626,295	1,476,582	2,103,323	2,922,760	3,789,396	3,722,390
	Import	13,917	161,896	271,889	148,174	172,135	412,579	349,567

Source: Directorate of Estate Crops Product Processing and Marketing, Directorate General of Agricultural Product Processing and Marketing Department.

Table A10—Export Import Volume of Estate Crops (in Ton)

Commodity		1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-02
Rubber	Export	757,173	855,854	909,154	1,082,418	1,034,688	1,470,727	1,474,686
	Import	0	840	921	353	2,527	15,081	12,842
Coconut	Export	278,956	365,678	347,528	515,523	560,634	802,302	519,454
	Import	255,202	312,742	0	10	24,871	13,687	1,324
Palm Oil	Export	275,102	415,324	313,698	820,512	1,602,418	3,179,162	6,282,375
	Import	0	1	26,377	183,331	145,635	46,908	6,319
Cocoa	Export	1,184	4,992	20,006	66,555	202,956	353,515	378,962
	Import	200	3,318	5,565	547	2,100	9,695	37,032
Coffee	Export	99,900	194,277	251,192	332,461	303,885	346,287	287,914
	Import	93	111	44	71	1,103	6,005	7,906
Pepper	Export	20,885	30,672	35,086	38,486	46,826	42,052	58,905
	Import	18	28	6	42	20	3,757	2,796
Sugar	Export	223,642	180,781	520,488	608,756	596,779	205,888	110,356
	Import	52,998	312,742	316,723	189,402	229,854	1,234,338	1,210,590
Cashew Nut	Export	0	106	2,044	5,480	23,752	29,996	46,515
	Import	0	0	0	0	192	220	64
Total	Export	1,656,842	2,047,684	2,399,196	3,470,192	4,371,937	6,429,930	9,159,166
	Import	53,310	317,040	349,636	373,757	406,302	1,329,690	1,278,873

Source: Directorate of Estate Crops Product Processing and Marketing, Directorate General of Agricultural Product Processing and Marketing Department.

Table A11—Export and Import of Livestock Products: 1997-2002

		1997	1998	1999	2000	2001	2002
Export Value (US$)	Beef	120,297	4,138	180,438	92,522	245,888	203,740
	Chiken	935	3,336,890	3,912,114	1,321,294	3,348,627	4,827,807
	Duck, goose	154,894	191	107,163	151	213,785	1,482,658
	Pork	1,421,786	239,719	228,102	527,286	546,521	2,633,108
	Goat	0	101,329	19,611	131,702	232,303	300,421
	Total	1,697,912	3,682,267	4,447,428	2,072,955	4,587,124	9,447,734
Export Volume (Kg)	Beef	54,378	1,156	75,276	31,787	226,049	81,818
	Chiken	1,800	2,996,195	2,859,307	708,381	1,740,231	2,346,322
	Duck, goose	75,608	263	63,131	15	90,627	651,743
	Pork	379,125	188,669	223,894	692,159	460,678	3,551,915
	Goat	0	68,484	12,527	34,571	86,302	39,074
	Cattle and poultry feed	22,334,827	17,794,363	25,412,890	20,851,475	12,540,130	2,950,189
Import Value (US$)	Beef	51,318,944	18,598,919	27,055,733	61,566,543	40,463,362	41,317,070
	Chiken	369,480	346,834	2,722,057	9,473,488	618,087	163,793
	Duck, goose	594,931	642,017	576,344	607,792	434,308	735,882
	Pork	269,507	111,754	213,274	564,278	1,012,323	461,325
	Goat	1,021,747	557,828	499,142	655,129	812,823	938,580
	Total	53,574,609	20,257,352	31,066,550	72,867,230	43,340,903	43,616,650
	Processed meat	2,904,674	982,176	1,086,461	2,289,276	1,408,759	1,538,753
Import Volume (Kg)	Beef	38,930,817	19,513,450	27,749,964	14,017,438	41,132,825	42,874,271
	Chiken	449,276	346,296	4,070,365	563,056	964,341	311,728
	Duck, goose	361,790	407,329	419,203	476,540	489,918	638,225
	Pork	167,057	72,454	124,539	591,842	223,107	359,363
	Goat	688,956	429,999	434,774	3,042,133	691,741	482,637
	Processed meat	2,910,105	857,860	1,732,653	125,652,962	2,567,735	2,114,010

Source: CBS, various years.

Table A12—Average Yearly Export and Import of Fish and Growth in Export and Import: 1980-2000

	1980-85	1986-90	1991-95	1996-2000
Export Value (000 US$)	241,259	676,947	1,475,607	1,670,986
Export Volume (Ton)	82,011	195,574	493,558	593,124
Import Value (000 US$)	31,670	31,457	95,707	94,531
Import Volume (Ton)	58,163	58,136	154,321	120,905
		Growth		
Export Value (000 US$)	2.51	32.66	11.63	-1.13
Export Volume (Ton)	2.12	30.63	12.53	-0.87
Import Value (000 US$)	8.47	18.99	22.37	-21.10
Import Volume (Ton)	11.20	11.31	28.43	-15.46

Source: CBS, various years.

Table A13—Export and Import Value of Ornamental Plant (in million US$)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Export	3.31	5.33	6.34	4.69	3.54	4.49	2.45	2.22	10.17	6.66	9.84
Import	1.35	0.38	1.25	1.33	2.39	2.04	2.46	0.99	0.96	1.43	1.05

Source: ASBINDO

Table A14—Price Trends of Selected HV Products in Local Currency Unit per Metric Ton

		1981-1985	1986-1990	1991-1995	Avg. Growth (%) 1980-1995
Fruits	Oranges	651,416	861,072	1,302,772	10.51
	Mangoes	345,470	591,046	1,144,420	15.99
	Pineapples	163,360	157,849	164,677	6.95
	Papayas	152,238	189,432	234,636	9.36
Vegetable	Potatoes	292,376	292,007	471,125	8.87
	Cabbages	99,800	127,472	192,876	7.86
	Tomatoes	267,600	223,115	318,403	8.38
	Chili Pepper, Green	916,678	1,194,020	1,579,512	10.00

Data Source: FAO Stat.

Table A15—Relative Price Trends of Selected HV Products

		1981-1985	**1986-1990**	**1991-1995**	**Avg. Growth (%) 1980-1995**
Fruits	Oranges/Rice, Paddy	4.30	4.00	3.59	1.90
	Mangoes/Rice, Paddy	2.29	2.65	3.19	7.14
	Pineapples/Rice, Paddy	1.09	0.76	0.46	-1.43
	Papayas/Rice, Paddy	1.00	0.89	0.65	0.68
Vegetables	Potatoes/Rice, Paddy	1.92	1.30	1.31	-1.09
	Cabbages/Rice, Paddy	0.67	0.57	0.54	-1.38
	Tomatoes/Rice, Paddy	1.78	1.03	0.89	-0.73
	Chili/Rice, Paddy	5.99	5.44	4.44	1.50

*Chilies &Peppers, Green; Data Source: FAO Stat.

Table A16—Summary Statistic

Variable	# of Obs.	Mean	Std. Dev	Min	Max
Production					
Chili Pepper (in hector)	390	8287	14328.25	6.00	103626.00
Banana (in Mt)	546	97457.84	177935.8	329.00	1333879.00
Pineapple (in Mt)	542	16004.26	41812.23	0.50	385947.00
Price					
Chili Pepper (Rp./Kg)	234	308088.7	244620.7	9128	990809
Paddy (Rp./Kg)	401	415.03	363.06	26.64	1850.24
Pineapple (Rp./Kg)	201	3839.48	3298.96	252.61	25000
Banana (Rp./Kg)	257	925.78	701.96	207.12	3449.99
Other Controls					
Rural Road in km	105	311.5505	260.1832	0	1117
Number of Tractors	362	1704.834	3308.541	2	16168
Number of Agriculture Workers	337	1661251	2072816	6721	8790747
Economic Crisis	667	0.26	0.44	0	1

Data Sources: CBS, Indonesia, various years.

Table A17—Farm Gate Price of Different Provinces as a % of Wholesale Price in Jakarta

	Province:	1984	1987	1990	1993
Chili Pepper	West Java	26%	15%	44%	43%
	Central Java	29%	15%	47%	53%
	Yogyakarta	23%	15%	47%	58%
	East Java	3%	14%	43%	49%
	South Sulawesi		4%	21%	28%
Potato	West Java	99%	83%	90%	88%
	Central Java	72%	68%	76%	73%
	Yogyakarta	80%	91%	82%	59%
	East Java	93%	67%	72%	69%
Orange	West Java	61%	62%	61%	60%
	Central Java	76%	73%	81%	74%
	Yogyakarta	81%	70%	78%	71%
	East Java	67%	71%	49%	42%
	South Kalimantan		31%	32%	24%

Source: Computed from CBS data.

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