Procurement of Fresh Produce by Modern marketing Channels and their impact on Farming household – Evidence from India

**(Paper for presentation at 10 th Annual Conference on Economic Growth and Development
to be held in ISI, Delhi)**

Rajib Sutradhar*
PhD Scholar (Economics)
Centre for Study of Regional Development
Jawaharlal Nehru University
New Delhi-67

1. Introduction:-

The agri-food system in developing countries has witnessed significant changes in the recent times, the most prominent being the rise of supermarkets[1] as a purveyor of food to urban consumers (Reardon et al, 2003). The increasing share of supermarkets, in its wake, has brought several institutional and organizational changes in the agri-food system, with agricultural transactions that were traditionally made through spot markets now being increasingly channeled through vertically-coordinated markets (Reardon and Barrett, 2000, Peterson et al, 2001). Vertical co-ordination includes several forms of hybrid arrangements that are increasingly adopted by a typical supermarket chain, starting with specialized wholesalers in the wholesale markets, preferred suppliers and eventually its own procurement system that works through a hub of collection centres to procure directly from farmers (Reardon et al 2003). The shift towards vertical integration, primarily driven by increasing emphasis on grades and standards, environment and safety concerns, and advantages associated with economies of scale, have often translated into higher investment requirement in the farm, posing both challenges as well as opportunities for small and marginal farmers (Humphrey, 2007, Reardon and Barret, 2000). Given that small farmers are 'home to some 2 billion people including half the world's undernourished people and that majority of them are living in absolute poverty (Hazell, 2011)), the improvement in their condition is what Lipton (2006) define as 'key to cut mass poverty in rural areas'. In fact, a large strand of literature has identified the impact of supermarkets on small farmers as vital element in the modern agri-food system (Reardon et al, 2003) and the increasing attention has been paid to whether small farmers manage to participate successfully in the modern agri-food system (Berdegue et al 2007, Hernandez et al 2007, Reardon et al 2007a, Reardon et al 2007b, Henson et al 2005, Jaffee and Masakure 2005, Dries and Swinnen, 2004).

Albeit late when compared to countries with similar per capita income, the retail industry in India has witnessed significant changes in the recent times, with the share of supermarkets rising significantly to already account for 7.5% of the total retail market within a span of a decade and half, a figure that is expected to reach 10% by the end of 2018[2]. The available literature suggests that the rise of supermarkets in India has been one of the fastest in the world, with the sector recording 49% average yearly sales growth for a period covering 2002/3 to 2009/10 (Reardon and Minten, 2011). In what has been termed as 'precocious penetration' by Reardon et al (2012), the diffusion of supermarkets in India stands out on several aspects. Within a few years of diffusion, the share of fresh fruits and vegetables rose to 10-15% of the store sales of the leading supermarket chains[3], something that took Mexico 15 to 20 years and some 40 years in United States (Reardon et al, 2012). However, none of the changes would have mattered had the supermarket chains followed business as usual strategy, procuring fresh produce, like their traditional counterparts, from the traditional mandi. In a break away from the pattern noted in international literature, most supermarkets in India, quite early in their diffusion, have already developed their back end operation, largely involving a set of collection centres that procure fresh produce from farmers directly (Reardon and Minten, 2011).

---

[1] The supermarket is used as short hand to denote all the formats of modern retail chains that include Hypermarket, supermarket, neighbourhood stores, convenience stores and co-operative modern retail

[2] Pulse of Indian retail market: A survey of CFOs in Indian retail sector, march 2014, http://www.rai.net.in/EY-RAI_Pulse_of_Indian_retail_market_Final.pdf, accessed on 20th April, 2014.

[3] The case studies of supermarkets in Delhi finds evidence of share of fresh fruits and vegetables rising significantly to already reach 15% of the total produce of the supermarkets.

The smallholding character of Indian agriculture is more dominant than ever before, with small and marginal farmers accounting for 83% of the operational land (Chand et al 2011). These farmers face numerous constraints accessing input and output markets, leading to smaller value realization among others (NCEUS 2007).In a setting such as this, the diffusion of supermarkets in India has sparked debate in India, raising the specter of livelihood concerns for small and marginal farmers (Singh 2012, Chandrasekhar 2011, Reardon et al 2011, Shah 2011, Singh 2010, Pritchard et al 2010, Reardon et al 2010, Kohli and Bhagawati, 2010, Gopalakrishnan and Sreenivasa 2009). Not surprisingly, the recent policy changes introduced by the Government in liberalization of FDI in the retail sector has sparked off controversy, with some strand of literature arguing that such policy decision will endanger the future of small farmers (Singh 2011, Shah 2011, Gopalakrishnan and Sreenivasa 2009). Another strand of literature such as (Kohli and Bhagawati, 2010) advocate such policy changes, arguing that both farmers and consumers stand to benefit from higher efficiency brought in the supply chains. Despite little consensus, empirical literature documenting the actual impact on farmers of supplying to the supermarket driven marketing channel in Indian context is conspicuous by its absence. The few recent literature such as Pritchard et al 2010 and Mangala and Chengappa 2008 have only examined the issue of smallholder participation in the supermarket driven marketing channel, using a very small sample, with very little focus on the impact of such participation on their livelihoods. The present paper, drawing on evidence documented through field survey in the outskirt of Jaipur city in the state of Rajasthan, attempts to fill the gap in the literature and thus settle the debate on an issue that has significant implications for rural livelihood.

An examination of this issue in turn leads us to pose several research questions. How important is farm size in accessing the supermarket driven supply chains in an agrarian setting dominated by small and marginal farmers? If farm size is not important, what are the other factors that influence the participation of farmers in the supermarket channel? What impact does such participation decision have on the welfare of small farmers? Do supermarket channels offer better prices compared to the traditional marketing channels? Or do the farmers sell to the supermarket channel simply because they benefit in terms of lower transaction costs compared to the traditional markets?

The present paper makes an attempt to address these questions based on the evidence collected through field survey. The paper is arranged in the following ways. The first part describes the survey area, the second part deals with the description of survey design, followed by a section elaborating descriptive statistics and then a section on empirical methodology used in the study. The subsequent section explains the econometric results and final section concludes the study.

2. Description of Survey Area

Taking a cue from Minten and Ghorpade (2007) which conducted an exploratory study of Reliance Fresh based on interviews and focused group discussion in villages located on the outskirts of Jaipur City, we visited some of these villages in March 2010 and conducted a pilot survey and focused group discussion with farmers, commission agents, wholesalers, retailers and representatives of Reliance Fresh chain to better understand the activities of different actors active in the trading of fresh produce in the villages located in the outskirt of Jaipur city.

Our choice of Reliance Fresh as the supermarket chain to be studied is driven by the fact that the supermarket chain has already assumed the pan Indian character with its stores, numbered more than 800, rolled all over India (see figure 1).

Distribution of Reliance Fresh stores across states in India
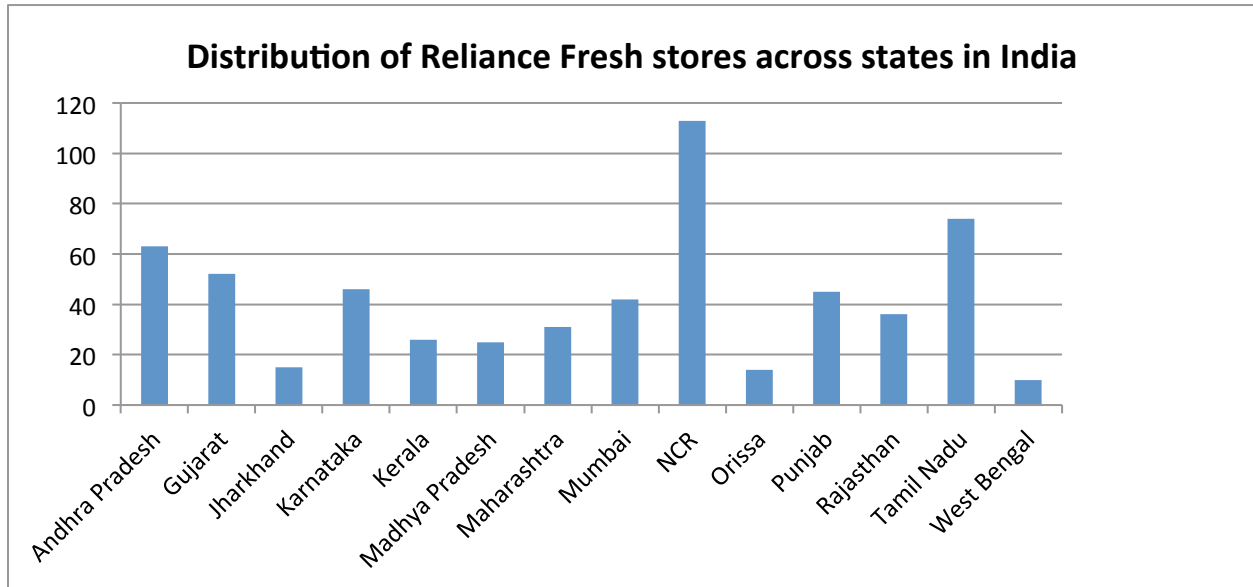
Fig1: Distribution of Reliance Fresh stores across states (*Source: data collected from the procurement manager of Reliance Fresh in Jaipur, March 2009*)

Moreover, first set up in Hyderabad, Reliance Fresh brought several changes to the back end operation over the years to customize its procurement operation to suit both its own needs and adapt itself to the local conditions. Over the period, Reliance Fresh has sustained its back end operation, thus establishing itself as a model of back end operations that may exist in rural India.

Based on the information collected in the pilot survey, we identified Chomu and Ameer Fort as areas where Reliance Fresh is still active, procuring fresh produce directly from the farmers through a set of collection centres. Both the regions have fertile land and access to irrigation facilities, and have long been known for producing both seasonal and off seasonal vegetables which the farmers in the region supply to both Rajasthan and other neighbouring states.

Around the time of our two visits to the survey area, first time in March 2010 and then again in June 2010, we find that Reliance Fresh and Mother Dairy are the only two among the supermarket chains active in the city of Jaipur that continued to procure directly from the farmers. The focus of our theme is, however, on Reliance Fresh for the present paper, the reason being that the supermarket chain has already assumed the pan Indian character with its stores, numbered more than 800, rolled all over India (see figure 1).

After reporting losses in the initial period, Reliance Fresh, as part of its austerity drive, restructured its back end operations and set up either makeshift collection centre or the mobile collection centre, using a local farmer as its agent instead of more elaborate structure that the company used to have in the beginning of its operation.

3. Survey Design:-

We have picked two crops –Spinach and Cauliflower to study how the farmers interact with the supermarket channel. The rationale behind the choice of two crops is that these two crops represent different risk return trade off. Spinach is a labour intensive crop that is grown in a staggered manner in tiny plots that ensure steady flow of income for the asset poor small and marginal farmers. Cauliflower, on the other hand, is relatively more capital intensive crop and hence involves more risk.

We rely on information collected from both wholesalers and the procurement in charge of Reliance Fresh based in Jaipur city to identify villages in Chomu Block that are known for the production of cauliflower. Based on information provided by the procurement manager of Reliance Fresh and later also verified by local farmers and local Reliance Fresh agent, we have listed the villages where Reliance Fresh is active in procurement of cauliflower from the farmers. Two villages with the largest number of farmers that supply cauliflower to Reliance Fresh have been shortlisted and another village from the nearby areas that grow cauliflower but reports little or no procurement by the supermarket chain has been shortlisted. From now on wards, we define the first two villages as supermarket villages and the latter one as traditional village. All the villages are located close to each other and with the exception of their proximity with Reliance Fresh collection centre and local Reliance Fresh collection agent , we observes little differences across villages, even in terms of connectivity with the main road. We then conducted census in these villages to obtain the list of farmers that sell atleast some part of their cauliflower produce to Reliance Fresh and the others that sell only to the traditional wholesale market. Because of limited demand from Reliance Fresh, we found very few farmers that sell exclusively to the Reliance Fresh collection centre. We therefore identified a farmer who sells part or whole of fresh produce to Reliance Fresh as supermarket farmer and a farmer who does not sell any fresh produce to Reliance Fresh as traditional farmer.

Because of our limited budget, we set up the sample as 30 supermarket farmers and 15 traditional farmers to be chosen randomly from the list in each supermarket village and 20 traditional farmers to be chosen randomly from the list in the traditional village , thus giving us a sample of 60 supermarket farmers and 50 traditional farmers. After a careful scrutiny of data thus collected, we had to drop couple of sample observations because of incomplete information, and we thus ended up with a sample of 55 supermarket farmers and 45 traditional farmers.

With a repeat of similar exercise for spinach in Ameer Fort Block, an area known for production of leafy vegetables, we obtained two supermarket villages and one traditional village that gave us finally a list of 45 supermarket farmers and 55 traditional farmers.

4. Empirical Methodology:-

To know the importance of different factors that influence the participation by farmer households in the supermarket driven marketing channel, we may estimate the probit regression

Channel Choice $C_i = f(X_1, X_2, X_3, X_4)$

Where X_1, X_2, X_3 and X_4 represent household characteristics variables, physical asset variables, social capital variables and transaction cost variables respectively. The details of the different variables are discussed in more detail in the next section.

In the second stage, we set up the theoretical model as follows -

$R_i = a + b\,C_i + c^\wedge X_i + \varepsilon$

Where R_i is the gross margin per acre of i-th farmer, C_i is the predicted probability of Reliance Fresh participation. X_i is a vector of control variables and ε's are zero mean variables. *b* measures the impact of supermarket participation on gross margin per acre.

However, in a non random experiment such as ours, the assessment of impact of supermarket participation often runs into the problems of sample selection bias, as the farmers participating in the supermarket channel may self-select into such program. Not accounting for inherent sample bias may lead to overestimation of the effect of participation in the supermarket channel. The supermarket farmers, in any case, reap higher revenue compared to the traditional farmers irrespective of their status on supermarket participation because of inherent characteristics that are usually overlooked in the regression exercise. Such a problem of sample selection bias can be dealt by either instrumenting the contract dummy or augmenting the equation by adding a selection correction term (Ramaswami et al, 2009).

Here, we have adopted the latter approach. We have tried to overcome such sample selection bias by using the **treatment effect model** (also called **Heckman Selection correction model**) which uses the participation probit model (selection equation) to calculate hazard ratio that corrects for possible selection bias and yields unbiased and consistent estimates in the outcome model. We have implemented this analysis as a two step procedure. Identification is provided by including a variable in the selection model that is not found in the outcome equation. The identification variable in our model is the distance between the farm household and the Reliance Fresh Agent. Our observations in the field suggest that the physical distance between the farmers and the Reliance Fresh Agent also reflects 'social distance' between the two. The farmers located closer to the supermarket agent stand better chances of supplying to Reliance Fresh compared to those that don't live close to the Agent, making it a good predictor of supermarket participation. As the Reliance Fresh does not offer any extension facilities, it is unlikely that the proximity with its local agent positivity influences the outcome of the farmers, thus making it a valid instrument.

To check the robustness of the results, we used the Propensity Score Matching (PSM) approach. The PSM approach is extensively used in program evaluation literature (Heckman et al, 1998, Dehejia and Wahba 2002, Jalan and Ravallion, 2003). To avoid the bias that may arise from non randomness, **Propensity Score Matching (PSM)** method finds a non treated unit that is 'similar'

to a participating unit, so that difference between the participant and the matched comparison case can be used as an estimate of the intervention's impact.

Both the treatment effect model and PSM approaches have their own advantages and disadvantages. Though the treatment effect model, already discussed, makes a similar attempt to deal with the estimation of impact on the outcome, it assumes that income functions would differ only by a constant term between the participants and non participants. However, there may be interactions between the choice of supermarket channel and the other income determinants captured in X_i, making the differences between the supermarket channel farmers and traditional channel farmers more systematic (Rao and Qaim, 2011). The propensity Score Matching (PSM) approach deals with structural differences based, however, only on observables. In PSM approach, a probit regression is run assuming 1 if the farmer sells his produce to the supermarket and 0 if he does not sell his produce to the supermarket. In the probit regression, the control variables included for analysis are the same variables that we have considered in the market selection equation in the treatment regression just discussed. A propensity score obtained from this model allows for matching the supermarket farmers with traditional farmers. We use common support approach to ensure that density of control and treatment group overlap to the maximum extent possible. This is further modified by using the kernel PSM which matches supermarket farmers with a weighted average of traditional farmers, higher weights being given to farmers who match more closely with the supermarket farmers compared to those that don't.

The second part of our econometric estimates involves price comparison across traditional and supermarket channels. Prices of a product may vary depending on the quality, space and time of sale (Deaton, 1988). To overcome the bias in the price comparison that may arise from overlooking these differences, two econometric techniques are used: - hedonic price regression and propensity score matching technique. Following Minten et al (2010), we have modeled the price of a product as a function of product characteristics based on the assumption that the marginal utility and the implicit price for each product characteristics are constant. The model can be estimated as

$$P_h = \sum \beta_{kh} X_h^k + v$$

Where P_h is the price of the product h, X_h^k is the level of the attribute k in the product h, β_{kh} the implicit price of the attribute k and v a stochastic error term. Based on detailed discussion with supermarket procurement manager and wholesalers, we have identified quality indicators of both cauliflower and spinach and assigned levels to each of one of those indicators depending on the quality of the produce. We have listed size, degree of yellowishness and freshness as three quality indicators of cauliflower. Similarly, we have identified size, freshness and ripeness (yellow color) as quality indicators of spinach. Very fresh and medium sized cauliflower with no yellow spot is considered as the best quality cauliflower. Similarly, very fresh, medium sized spinach with no ripe leaves is considered as the best quality spinach[4].

---

[4] To ensure objectivity in the data collection, we have objectively defined each quality indicator of crops. In case of cauliflower, we define three levels of size as small, medium and large, degree of yellowishness/ compact is also categorized in three levels, these being no yellow spot, 0-5 % and more than 5% yellow spot. Similarly, freshness of cauliflower is defined as very fresh, not fresh. In case of spinach, we have defined indicators namely size, ripeness and freshness as three indicators of quality an assigned levels to each indicator and assigned levels to each indicator.

Here again, we check the robustness of the results with the propensity score matching (PSM) approach, where a probit regression is run assuming 1 if the produce is sold in the supermarket and 0 if the produce is sold in the traditional wholesale market. In the probit regression, the control variables included for analysis are quality attributes just discussed and date on which produce is sold. A propensity score obtained from this model allows for matching the treatment food product (produce sold to the supermarket chain) with the control food product (produce sold in the traditional market). We use common support approach to ensure that density of control and treatment group overlap to the maximum extent possible. This is further modified by using the kernel PSM which matches food sold in the supermarket chain with a weighted average of those sold in the traditional wholesale market.

5. Descriptive Statistics:-

Table 5.1 compares the supermarket farmers with the traditional farmers on basic household and transaction costs variables for both the crops- cauliflower and spinach. As for cauliflower, the supermarket farmers are found to be younger compared to their traditional counterparts. They are also located closer to Reliance Fresh agent and report higher value of farm equipment in their possession compared to the traditional farmers. Regarding spinach, supermarket farmers are located closer to both collection centre and agent of collection centre compared to their traditional counterparts. Supermarket farmers growing spinach also report significantly higher value of livestock compared to their traditional counterparts. In an exception of trend noted in the international literature, there is no significant difference in farm size between the supermarket and traditional farmers for both cauliflower and spinach. *Simpson's diversity Index,* estimated to measure the extent of diversification, shows there is not much difference in the extent of diversity followed by supermarket farmers vs traditional farmers for both cauliflower and spinach.

In an indication of better wealth position and greater mobility, a higher percentage of supermarket farmers reported ownership of tractor compared to the traditional farmers for both the crops - cauliflower and spinach. Similarly, a higher percentage of supermarket farmers that sell cauliflower to Reliance Fresh reported ownership of scooter/ bicycle compared to the traditional farmers.

Mobile has become a common household asset even in traditional rural society like the one that we surveyed, with majority of households across market participation status reporting ownership of mobile phones.

These include size (1=small, 2=large 3=Mixed), ripeness (1=green, 2= ripe (yellowish) 3= mixed) and freshness (1=very fresh, 2= not very fresh). We showed farmers pictures of each category to ensure objectivity in assessment.

Table 5.1: Differences between the supermarket channel and traditional channel farmers for two crops

	Cauliflower		Spinach	
	Traditional farmers	**Supermarket farmers**	**Traditional farmers**	**Supermarket farmers**
Number of observations	45	55	55	45
Average age of farm household head (in years)	45.55**	41.02**	42.40	42.47
Farm size (in acres)	3.17	3.46	1.25	1.35
Farm head with education up to middle and secondary (% of hhs)	59.99	85.46	30.92	53.33
Family size (Number of persons)	6.89	6.62	6.89	6.62
Ownership of mobile phone (% of hhs)	84.44	98.18	87.27	77.78
Member of cooperative (% of hhs)	42.22	43.30	4.44	36.36
Average distance from cc Reliance (kms)	5.10	4.5	2.05***	1.26***
Average distance from reliance agent (Kms)	4.24***	2.47***	1.79***	1.14***
Average value of farm equipment (in Rupees)	221715.60***	342845.80***	155294.50	192777.80
Average value of livestock (in Rupees)	66400	80473	21300***	40454.55***
Ownership of tractor (% of hhs)	48.89	72.73	34.55	42.22
Ownership of scooter/bicycle (% of hhs)	48.89	58.18	56.36	55.56
Simpson's diversity index	0.82	0.82	0.74	0.78

Source:-Author's survey data. ***, **, and * indicate the level of significance at 1%, 5% and 10% level of significance.

In Table 5.2, we compare the per acre expenditure of different inputs incurred by the supermarket and traditional farmers for both the crops – cauliflower and spinach. The supermarket farmers selling cauliflower to Reliance Fresh report significantly higher per acre expenditure compared to their traditional counterparts for most inputs such as seed, irrigation, organic, tractor and labour. Though the supermarket channel farmers report higher per acre total expense than the traditional channel farmers, they also report significantly higher per acre gross revenue than their traditional counterparts. We estimate the gross revenue per acre by deducting from the total revenue total expense per acre inclusive of the imputed value of family labour. The gross margin per acre thus estimated is found to be significantly higher for supermarket farmers compared to those reported by the traditional farmers.

However, the difference between the per acre input expenditure incurred by the supermarket and traditional farmers growing spinach shows no consistent pattern. The difference in per acre input cost reported by the two groups – supermarket and traditional farmers is found to be insignificant for most inputs. Though the supermarket farmers report higher per acre gross revenue compared to their traditional counterparts, they also incur higher per acre input expenditure, yielding little difference in the gross margin per acre.

Table 5.2. Per acre expenditure on different inputs by cauliflower and spinach farmers across marketing channel

Different heads of input	Cauliflower		Spinach	
	Traditional farmers	**Supermarket farmers**	**Traditional farmer**	**Supermarket farmer**
Seed	2769.37***	3680.86***	1322.5	1286.11
	(1948.08)	(2769.37)	(356.29)	(374.64)
Fertilizer	3206.28	3725.58	1001.14	1027.96
	(2028.99)	(1298.66)	(430.87)	(570.41)
Pesticide	2821.38	4855.28	1753.41	1748.61
	(5030.41)	(7216.09)	(785.56)	(733.54)
Irrigation	1317.96***	1992.29***	971.36*	1080.56*
	(839.88)	(1336.62)	(351.33)	(250.22)
Organic	2294.51**	3488.48**	1936.36	1677.22
	(1360.33)	(3142.74)	913.05	644.33
Tractor	1783.58*	2106.36*	1445***	1092.78***
	(812.22)	(1028.08)	(692.44)	(644.44)
Labour	4205.55***	6200***	4604.55	4801.22
	(2121.68)	(3287.76)	(1652.5)	(1665.48)
Total expense	18398.64***	26048.86***	13034.32	12714.46
	(7548.06)	(10595.26)	(2129.44)	(2684.14)
Total revenue	37813.61***	56294.7***	33897.74	35282.6
	(11972.50)	(32504.85)	(18425.61)	(19061.05)
Gross margin	19414.97***	30245.48***	20863.42	22568.14
	(12428.5)	(31585.87)	(17693.85)	(18178.44)

Source: *Author's field survey*, ***,** and * indicate the level of significance at 1%, 5% and 10% respectively.

b) Discussion of results:-

As already explained, we applied Heckman Selection Correction model or Treatment effect model that involves the estimation of two equations together to account for selection bias – selection equation that estimates the probability of participation in the supermarket channel and the outcome equation that estimates the impact of participation in the supermarket channel on the gross margin per acre. We implement this analysis in a two step process rather than maximum likelihood approach. The results of the selection equation, estimated separately for cauliflower and spinach, predicts the probability of participation in the Reliance Fresh and reflects on the importance of different factors in the choice of supermarket channel.

Among the independent variables that may affect the decision to sell fresh produce to the supermarket, we have taken a vector of variables that include household characteristics variables, physical assets variables, social capital variables and transaction costs variables. The household characteristics variables include age of the household head (HHH), education of HHH and the family size. The physical assets variables include the farm size, farm assets, value of total livestock and dummies indicating ownership of vehicles and mobile phones, all lagged at 2005. The decision to participate in the supermarket Channel may, in all possibility, be also influenced

9

by the prices offered by the supermarket collection centre. However, the prices offered by the supermarket channel on a given day do not vary across farmers, we, therefore, have not included prices as one of the independent variables in the selection equation.

Similarly, we have taken a dummy for membership in co-operative as an indicator of social capital, with 1 standing for membership lagged at 2005, and 0 otherwise. The reason for taking the lagged value of physical assets and social capital variable is that the values of these variables, if taken at the present values, may run the risk of reverse causality, leading to an overestimation of the importance of these variables in the choice of supermarket channel. In other words, higher physical assets, reported by the supermarket farmers at present year, may also be the result of higher income that accrues from selling to Reliance Fresh. The choice of year 2005 as the lagged year is based on our field observation that Reliance Fresh started procuring in the region in 2006, which ensures that we don't have any endogeneity problem in the model.

Among the transaction cost variables, we have taken distances from all three marketing channels accessed by the farmers in the region that include agents of Reliance Fresh and Mother Dairy Co-operative and nearest wholesale market. To the vector of transaction cost variables, we have also added time taken by the farming households to reach the nearest town centre.

Expectedly, the education of the household head positively influences the decision to sell fresh produce in Reliance Fresh collection centre, perhaps indicating greater receptiveness and ability of the educated farmers to take decision in changing situation such as emergence of supermarket channel. The similar evidence of positive relation between the education of farmer household head and participation in the supermarket channel has also been noted in the extant literature (Neven et al 2009, Miyata et al 2009).

Expectedly, for cauliflower, farm assets and livestock assets, both lagged at 2005, positively influence the participation of farmers in Reliance Fresh collection centre, indicating that more capitalized farmers with access to regular source of income from livestock are more likely to sell to Reliance Fresh Collection centre. Similar pattern of asset rich small farmers participating in the supermarket driven supply chain have also been noted in the extant literature (Reardon et al 2009, Reardon et al 2012). Interestingly, farm asset variable is not found to be significant in case of spinach. Spinach is a highly labour intensive crop and the asset requirement to meet the standard set by Reliance Fresh may not be high. However, livestock variable is found to be significant, suggesting that regular source of income through livestock is sufficient to facilitate their participation in the supermarket channel.

Interestingly, farm size is not found to be an entry barrier in selling fresh produce in Reliance Fresh collection centre, lending credence to similar evidence noted by Reardon et al 2009 in the context of an agrarian setting marked by preponderance of small and marginal farmers. Interestingly, the coefficient of farm size is found to be negative and significant in the case of Cauliflower, indicating higher tendency among the farmers, with relatively smaller size of land holding, to sell their produce to Reliance Fresh Collection Centre. Perhaps, such farmers face higher transaction costs in the traditional market because of smaller size of marketable surplus, thus incentivizing them to look for other marketing avenues closer to their farm. We observe in the field that the local agent of the Reliance Fresh roams around the village in Reliance truck, picking up cauliflower from the farm gate, thus negating the importance of ownership of vehicle in accessing supermarket channel. As a corollary to this, we note that access to vehicle is not

found to be a key determining variable when it comes to farmers taking decision to sell their produce to supermarket channel. The result of spinach crop is also not much different. Spinach is a labour intensive crop, mostly grown by smallholders. Not surprisingly, farm size is not found to be significant in selling spinach to Reliance Fresh.

The transaction cost is a key determinant of farmer's decision to sell fresh produce to supermarket collection centre. The distance between the farmer house and the agent of Reliance Fresh collection agent is an indicator of social distance between the two and is also perhaps a measure of transaction costs. Expectedly, the closer proximity between the two raises the probability of selling the produce to the Reliance Fresh collection centre for both cauliflower and spinach. In a contrary, the distance from Mother Dairy Co-operative agent is positively related to the probability of selling cauliflower at Reliance Fresh collection centre, perhaps suggesting that access to other marketing avenues that procure fresh produce near farm gate such as Mother Dairy co-operative reduces farmer's incentives to sell the produce to the supermarket collection centre.

Similarly, the coefficient of access to mobile is found to be positive and significant in case of cauliflower, indicating that easy communication between Reliance Agent and farmer households facilitated by mobile raises the likelihood of participation in the supermarket channel.

In the outcome equation of cauliflower, the coefficient of the variable indicating the participation in Reliance Fresh Channel is found to be positive and significant at 1% level, indicating that the decision to sell fresh produce to supermarket channel has positive effect on gross margin reported per acre. The variable denoting access to vehicle lagged at 2005 also positively affects gross margin per acre of cauliflower. In case of spinach, supplying to Reliance Fresh has no effect on gross margin per acre. Among the other variables, farm size and the value of livestock, both lagged at 2005, positively affect gross margin per acre, but, contrary to our expectation, farm assets negatively affect the per acre gross margin. The farmers, perhaps, manage to draw upon the otherwise low working capital requirement of spinach cultivation from the regular and steady flow of income that they get from the livestock. Interestingly, coefficient of age of household head shows that younger farmers are more likely to reap better returns per acre of spinach cultivation, which is not surprising given that the crop requires more careful and regular labour management. Expectedly, access to social capital such as membership in co-operative positively influences the gross margin per acre in both crops- cauliflower and spinach. Being member of such collectivities reduces transaction costs of accessing inputs and technology, thus reducing by reducing transaction costs of accessing such inputs.

We check the robustness of the results with the propensity score matching that compares the gross margin per acre reported by the supermarket channel farmers with the traditional channel farmers. We present the results of the unmatched sample and the average treatment effect for the treated (ATT) in Table 5.4. In PSM approaches, we obtained a propensity score from the probit regression already estimated in our first part of the analysis to match and compare supermarket farmers with traditional farmers. We use common support approach to ensure that density of control and treatment group overlap to the maximum extent possible. This is further modified by using the kernel PSM which matches supermarket farmers with a weighted average of traditional farmers, with higher weights being given to those who matches more closely compared to those that don't.

11

Table 5.3. Treatment effect model of gross margin per acre income of cauliflower and spinach

	Cauliflower		Spinach	
	Coeff.	**Std. error.**	**Coeff.**	**Std. error.**
Selection equation (Participation in Reliance Fresh)				
Age of HHH (years)	-0.023	(0.02)	0.018	(0.02)
Education of HHH(years)	0.296**	(0.14)	0.180**	(0.09)
Family Size (persons)	-0.093	(0.10)	-0.078	(0.09)
Farm size, lagged at 2005 (in acres)	-0.096*	(0.05)	0.015	(0.06)
Farm asset, lagged at 2005 (in 000 rupees)	0.017***	(0.01)	0.001	(0)
Livestock, lagged at 2005 (in 000 rupees)	0.012*	(0.01)	0.019***	(0.01)
Vehicle dummy, lagged at 2005 (yes=1, 0 otherwise)	-1.728***	(0.70)	-0.303	(0.36)
Dummy for mobile, lagged at 2005 (yes=1, 0 otherwise)	1.500**	(0.77)	-0.616	(0.40)
Dummy for Co-operative, lagged at 2005 (yes=1, 0 otherwise)	-0.858	(0.53)	-0.007	(0.80)
Distance for Mother Dairy Agent (in kms)	0.535***	(0.20)	0.138	(0.18)
Distance for wholesale mandi (in kms)	-0.422**	(0.21)	0.013	(0.07)
Distance from nearest town centre (in kms)	-0.002	(0.01)	0.018	(0.02)
Distance from Reliance Fresh Agent (in kms)	-0.811***	(0.22)	-0.770***	(0.21)
Constant	1.959	(2.15)	-0.788	(1.58)
Outcome equation (Gross margin per acre (in Rupees)				
Age of HHH (years)	65.995	(61.71)	-131.551**	(55.23)
Education of HHH (years)	-1.113	(302.83)	-123.876	(340.44)
Family Size (persons)	3.896	(270.96)	-17.786	(317.48)
Farm size, lagged at 2005 (in acres)	58.844	(111.22)	343.120*	(201.48)
Farm asset, lagged at 2005 (in 000 rupees)	1.724	(8.43)	-23.978*	(14.18)
Livestock, lagged at 2005 (in 000 rupees)	-4.654	(12.73)	41.387**	(21.34)
Vehicle dummy, lagged at 2005 (yes=1, 0 otherwise)	2296.440*	(1264.28)	-833.588	(1209.44)
Dummy for mobile, lagged at 2005 (yes=1, 0 otherwise)	913.654	(2203.15)	-926.465	(1417.18)
Dummy for Co-operative, lagged at 2005 (yes=1, 0 otherwise)	3569.632***	(1364.4)	5245.247**	(2620.44)
Distance for Mother Dairy (in kms)	-174.647	(191.1)	-423.366	(609.61)
Distance for wholesale mandi (in kms)	349.885	(246.6)	290.015	(223.84)
Distance from nearest town centre (in kms)	25.238	(24.59)	-69.171	(52.49)
Distance from Reliance Fresh Agent (in kms)				
Participation in Reliance Fresh collection centre	5453.131***	(2117.58)	-1919.99	(2665.35)
Constant	-4501.268	(5005.59)	16120.850***	(5135.71)
Number of observations	100		100	
hazard lambda	-317.68	(1556.98)	2533.356	(1696.95)
Wald Chi2	52.91		55.8	
Prob> Chi2	0		0.0004	

*Source: author's field survey data, ***, **, * indicate the level of significance at level of significance at 1%, 5% and 10% level.*

The result of PSM supports what we already found in the treatment selection model. Though the difference between the gross margin per acre reported by the supermarket channel growers and traditional channel growers for cauliflower comes down when we move from the unmatched samples to the matched samples, the difference still remains significant even for the matched samples. In case of spinach, we do not find any significant difference in the gross margin per acre reported by the supermarket and traditional channel farmers both for the matched and unmatched samples, suggesting no significant impact of selling to Reliance Fresh on the gross margin per acre.

		Treated (Reliance Fresh)	Controls (Traditional)			
Variable	**Samples**			**Difference**	**S.E.**	**T-stat**
Cauliflower						
Gross margin per acre	**Unmatched**	10888.12	6209.74	4678.38	1147.34	4.08
	ATT	11763.15	7101.23	4661.91	2057.06	2.27
	Number of Observations	55	45			
Spinach						
Gross margin per acre	**Unmatched**	8750.81	7720.02	1030.79	1094.60	0.94
	ATT	9071.03	6777.05	2293.98	1514.15	1.52
	Number of Observations	45	55			
ATT: Average treatment for the treated						

Table 5.4: Propensity Score Matching results of comparisons of net impact of selling to traditional vs Reliance Fresh marketing channels

Source: Author's field survey

6. Comparison of prices between supermarket and traditional markets:-

The third component of our analysis compares prices received by the farmers across marketing channels, using the detailed information on the most recent transaction that include the details on quality attributes and transaction costs. We expect that Reliance Fresh follows a more stringent regime of standards and quality for the procurement of fresh produce for which they may possibly pay higher prices to the farmers. Our hypothesis is based on emerging research evidences that the supermarkets sells better quality produce compared to traditional retail. Such evidences have been noted in the case of both India (Deodhar, Landes & Krissoff, 2006), and abroad (Cadilhon, Moustier, Poole, Tam& Fearne, 2006 and Minten and Reardon, 2008). Some anecdotal evidences noted in the newspapers such as India Today, 2007 also reflect similar trend. However, evidences contrary to this can also be found in Indian context such as Minten, Reardon and Sutradhar, 2010 that noted no significant price difference between the traditional and supermarket channels after controlling for quality and other confounding factors. The trend noted in the procurement of fresh produce also point towards the supermarkets increasingly relying on private standards to control quality issues in the procurement of fresh produce (Berdegue et al 2005, Reardon et al, 2003, Reardon and Berdegue, 2002, Dolan and Humphrey, 2000). Similar evidences of supermarket chains applying their own standards have also been noted in the emerging literature in India (Pritchard et al 2010, Mangala and Chengappa, 2008). Typically,

much of these literature compare the prices across marketing channels based on the assumption that produce procured by supermarkets are atleast as good as the traditional as they procure only a part of the produce applying more rigorous standard. However, none of these studies compare prices controlling for quality. In the present section, we will make a more systematic attempt to assess the returns for quality by comparing the prices of produce across produce of comparable quality. It will be interesting to look at whether better quality produce, if procured by Reliance Fresh, is rewarded with higher prices.

Table 6.1: Product prices by type of marketing channel –Cauliflower					
	Traditional market		**Reliance Fresh**		
	Price/kg	**Obs.**	**Price/kg**	**Obs.**	
Cauliflower Prices					
Average	8.46	106	9.46	49	
SD	3.16		3.59		
Price difference					-1.001*
Cauliflower prices net of transaction costs					
Average	7.89	106	9.23	49	
SD	3.24		3.63		
Price difference					-1.34**

*Source: Author's field survey, ***, ** and * indicate the level of significance at 1%, 5% and 10% respectively*

A simple pair wise comparison of prices received by farmers for the two crops – cauliflower and spinach across marketing channels through t tests shows that farmers, on average, receive higher prices for cauliflower from Reliance Fresh compared to what they receive in the traditional markets and the price difference of Rs1 between the two channels is found to be significant at 10 % level (Table 6.1). We also collect the details of transaction costs incurred by farmers across marketing channels. Expectedly, a typical farmer selling cauliflower and spinach to Reliance Fresh incur significantly lesser transaction costs compared to traditional market. Farmer, on average, incurs costs of Rs 0.23 per kg when they sell cauliflower to Reliance Fresh compared to Rs0.56 incurred by them when they sell the crop in the traditional market. Similarly, when farmers sell spinach to Reliance Fresh, they, on average, incur transaction costs of Rs 0.26 per kg that compares with Rs 0.46 incurred by them when they sell spinach in traditional market. Once we account for the price differences net of transaction costs incurred per kg of cauliflower, the difference in the prices received by farmers across two channels extends to Rs1.34, which is found to be significant at 5 % level.

In case of spinach, we do not find any evidence of Reliance Fresh paying farmers prices higher than what they receive in traditional marketing channels. Though the farmers, on average, receive higher prices from traditional marketing channels compared to Reliance Fresh, the price premium disappears once we account for the transaction costs incurred per kg. In both the cases, the price difference between the two channels is, however, found to be insignificant (Table 6.2).

Table 6.2: Product prices by type of marketing channel –Spinach					
	Traditional Markets		**Reliance Fresh**		
	Price/kg	**Obs.**	**Price/kg**	**Obs.**	
Spinach					
Average	8.15	117	8.06	44	
SD	2.71		3.04		
Price difference					0.08
Spinach prices net of transaction costs					
Average	7.68	117	7.8	44	
SD	2.81		3.06		-0.12
Price difference					

Source: Author's field survey, ***, ** and * indicate the level of significance at 1%, 5% and 10% respectively

We also report below the share of the best quality indicator of each attribute in cauliflower and spinach produce sold across traditional and supermarket channels (Table 6.3). A comparison of share of the best indicator of each attribute of the produce sold across marketing channels shows that the quality of cauliflower procured by Reliance Fresh is better than those sold in the traditional market. The difference in the quality of spinach sold across marketing channel is found to be less stark though Reliance Fresh procures somewhat better quality spinach compared to those sold in the traditional market.

Table 6.3: Quantity and Quality indicators of most recent transaction cauliflower		
	Traditional marketing channel	**Reliance Fresh**
Cauliflower		
Size		
Medium	27.36	77.55
Colour		
No yellow spot	6.6	36.73
Freshness		
Very Fresh	93.4	95.92
Spinach		
Freshness		
very fresh	63.25	72.73
Ripeness		
No ripeness (yellowish shade)	0	2.27
Size		
Small	6.84	27.27

Source: Author's field survey

Does better quality produce procured by these marketing channels translate into higher prices? As discussed, a simple comparison of prices through t test shows that while farmers receive better prices for cauliflower (Table 6.1), this was not so in case of spinach (Table 6.2). As discussed in the empirical methodology, a hedonic price regression is run, using the price per kg reported by the farmer in their most recent complete transaction as dependent variable. The

independent variables considered for the hedonic regression include the log of quantity of produce sold and a number of categorical variables for the type of marketing channel, the quality indicators of the produce, and the date of produce sold (Table 6.4).

The result of hedonic price regression confirms what we already noted in the simple t test- that the Reliance Fresh collection centre offers higher prices for cauliflower even after controlling for quality and the price premium gets even more prominent when we consider the prices net of transaction costs. A repeat of similar exercise for price per kg of spinach shows no evidence of

	Prices		Prices net transportation costs	
Table 6.4: Hedonic price regression for cauliflower				
	Coefficient	t values	Coefficient	t values
Reliance Fresh marketing channel	0.97*	1.68	1.34**	2.31
	0.58		0.58	
log quantity	0.86	1.28	1.01	1.54
	0.68		0.66	
Number of observation	152		146	
R-square	0.24		0.27	
Root MSE	3.08		3.12	

Source: Author's field survey, ***, ** and * indicate level of significance at 1%, 5% and 10% respectively
Rs/kg=f(log of quantity, dummy for the marketing channel, quality indicators of the attributes, and date on which the produce is sold), traditional marketing channel is the default, we have only reported the coefficient of marketing channels and log of quantity.

price premium being offered by the supermarket channel (Table 6.5). However, when we consider prices net of transaction costs, the prices for spinach are found to be higher for Reliance Fresh collection centre compared to those received by farmers in traditional wholesale market and the price difference is found to be significant at 10% level.

	Prices		Prices net transportation costs	
Table 6.5 : Hedonic price regression for spinach				
	Coefficient	t values	Coefficient	t values
Reliance Fresh marketing channel	0.62	1.22	0.93*	1.83
	0.51		0.51	
log quantity	2.27***	8.53	2.51***	9.26
	0.27		0.27	
Number of observation	161		161	
R-square	0.51		0.53	
Root MSE	2.08		2.08	

Source: Author's field survey, ***, ** and * level of significance at 1%, 5% and 10% respectively

As already discussed in the methodology section, the robustness of the result on the price comparison has been further corroborated by Propensity Score Matching. To start the analysis

using propensity score matching, we first run a probit regression, the dependent variable being a dummy variable that takes the value of 0 if the food is sold in traditional marketing channel and 1 if the food is sold in the supermarket channel.

The control variables in the probit regression include the same variables that we considered in the hedonic price regression. We then construct a propensity score using the results of probit regression. Table 6.6 and Table 6.7 reported the propensity score matching impact estimates on

Table 6.6: PSM results of price comparison of Reliance Fresh versus traditional market					
Samples	Treated	Control	Difference	Std Error	T-stat
	(Reliance Fresh)	(Traditional)			
Cauliflower					
Prices					
Unmatched	9.46	8.38	1.08	0.57	1.88
ATT	9.41	7.73	1.68	0.80	2.10
Number of observations	49	96			
Prices net transportation cost					
Unmatched	9.23	7.82	1.42	0.59	2.40
ATT	9.17	7.22	1.95	0.82	2.39
Number of observations					
ATT: Average treatment for the treated					

Source: Author's field survey

prices of cauliflower and spinach, comparing the prices received by the farmers from Reliance Fresh with those that they receive in the traditional markets. The results of both unmatched sample and the average treatment effect for the treated are presented in Table 6.6 and Table 6.7.

Table 6.7: PSM results of price comparison of Reliance Fresh versus traditional market					
Samples	Treated	Control	Difference	Std Error	T-stat
	(Reliance Fresh)	(Traditional)			
Spinach					
Prices					
Unmatched	8.06	8.13	-0.07	0.50	-0.13
ATT	7.87	7.05	0.83	0.58	1.43
Number of observations	109	44			
Prices net transportation cost					
Unmatched	7.80	7.66	0.59	0.63	0.94
ATT	7.61	6.50	1.89	0.69	1.90
Number of observations	109	44			
ATT: Average treatment for the treated					

Source: Author's field survey

When we match the control and treatment group with similar characteristics (the same propensity scores), the prices received by farmers when they sell to Reliance Fresh are found to be significantly higher than those received by them in the traditional wholesale market and the difference widens when we consider prices net of transaction costs, supporting the results already noted in the t test and hedonic price regression.

The comparison of PSM results of Average treatment of the treated spinach sample shows that farmers don't get any price premium in Reliance Fresh compared to the traditional market.

7. Conclusion-

We now return to the question that we have raised in the beginning of our discussion. Does farm size really matter in the participation of supermarket driven marketing channel? if not, what are the other factors that determine farmer's participation in favour of supermarket channel? What impact does such participation have on their welfare? What explains the positive impact if any of such participation? Do the supermarket channels offer higher prices for better quality produce that they procure from the farmer? Or do the farmers sell to the supermarket channel simply because they benefit in terms of reduced transaction costs, measured in terms of both monetary costs and time taken to complete the transaction? Using a unique set of data collected through field survey in the outskirt of Jaipur city, we have made an attempt to address these questions. Our findings suggest that in an agrarian setting like India, characterized by the preponderance of small and marginal farmers, land may not be the key determinant of participation in the supermarket channel, but the exclusion of some type of farmers may still occur based on their access to non land assets. The study thus confirms the trend noted in the emerging strand of literature that the asset rich and relatively better educated farmers with an ability to undertake the investment needed to meet the standard specified by the supermarket channels stands a better chance of being part of modern agri-food system (Reardon et al 2009).

This brings in question whether supplying fresh produce by small farmers to the supermarket channel contributes to their net welfare. To answer this question, we examine the impact of supermarket participation on the gross margin per acre by using Heckman Selection Correction model that accounts for sample selection bias often encountered in the non random experiments such as ours. It is plausible that the farmers supplying to the Reliance Fresh collection centre may differ from those that don't supply to the supermarket collection centre on a number of characteristics that are not controlled in our regression exercise. If such sample selection bias is not controlled, we may get a misleading picture of the impact of supermarket participation on their net income. Our finding suggests that while the decision to sell cauliflower to Reliance Fresh collection centre has led to positive and significant impact on the farmer's gross margin per acre, no such impact has been noted in the case of farmers who sell spinach to the supermarket chain. We further check the robustness of our findings by using Propensity Score Matching method which supports the result estimated by the Heckman Selection correction model.

We further examine as to whether Reliance Fresh offers any price premium vis a vis traditional wholesale market by relying on the detailed information collected from the sample households on their most recent complete transaction with both traditional and supermarket channels. We note that the supermarket chain offers farmers higher price for cauliflower compared to what they receive in the traditional marketing channel, but the price difference in spinach between the

traditional and supermarket channel is found to be insignificant. However, price is a function of a number of confounding factors such as quality of produce and time and location of sale. Higher prices offered, as in the case of cauliflower by Reliance Fresh, may simply be because of the procurement of better quality produce. In such cases, the price premium offered by the supermarket channel may disappear once we control for quality of produce. We have applied a number of econometric exercises such as hedonic price regression and propensity score matching, and our results shows that the price premium offered by Reliance Fresh persists even after controlling for quality in the case of cauliflower. However, no such premium exists for spinach.

Even in the absence of any price premium, as in the case of spinach in our studies, the farmers may benefit from selling their fresh produce to the supermarket channel because of lower transaction costs. Comparison of transaction costs, measured in both monetary costs and time taken to complete the transaction, shows that the transaction costs reported by the farmers in the supermarket channel is significantly less than those incurred by the farmers in the traditional markets for both cauliflower and spinach.

However, at this of supermarket diffusion, we can't claim to know all the answers as to how the participation in the supermarket driven agri-food system may affect the net welfare of the farmers, especially when such participation is itself a dynamic process. Despite the rapid diffusion of late, supermarkets remain a minor actor at present, with the procurement agent setting its prices based on the prevailing wholesale market prices. In our survey, over 90 % of the farmers who sell their fresh produce to the Reliance Fresh still compare the prices that they receive from the supermarket channel with the prevailing prices in the wholesale market, underlining latters' importance to ensure that farmers get fair prices from other private players. At this stage of supermarket diffusion, we may raise a counterfactual question. Will the status quo remain if the share of supermarket in total retail market increases enough, eventually making it a monopsony player? What should be the state policy towards the agricultural marketing in general and the wholesale market in particular? We maintain that the competitive market involving many players vying for the same produce of the farmers is the best way to ensure that monopsony market does not arise, thus ensuring that both farmers and consumer benefit from any innovation in the marketing of agricultural produce. Instead of setting the house in order, the removal of APMC Act, as was the case in the state of Bihar, is certainly not the solution. While the state should amend the APMC Act to encourage the direct procurement of fresh produce from the farmers, giving them more marketing options, it can't shy away from its responsibility towards better provision of infrastructure in the wholesale markets to promote an inclusive agri-food system. Such initiative ensures sustainable benefits for not just those who are part of supermarket driven marketing system but also the other resource poor farmers who are presently excluded from it.

References:-

Berdegue J, Balsevich Fernando, Flores Luis and Thomas Reardon (2005): Central American supermarkets' private standards of quality and safety in procurement of fresh fruits and vegetables. *Food Policy,* Vol 30, pp.254-269

Cadilhon, J., Moustier, P., Poole, N. D., Tam, P. & Fearne, A.P. (2006)Traditional vs modern food systems? Insights from vegetable supply chains to Ho Minh City (Vietnam). *Development Policy Review* 24(1), 31-49.

Chand, Ramesh, PAL Prasanna and A Singh (2011): Farm size and productivity: Understanding the strengths of smallholders and improving their livelihood, *Economic and Political Weekly,* 46(26/27), June 25, 5-11

Deaton, A (1988): Quality, quantity and spatial variation of price, *American Economic Review,* 78(3), 418-430

Deodhar, S.Y., Landes, M., & Krissoff, B.(2006) : *Prospects for India's emerging apple markets,* United States Department of Agriculture, FTS-391-01

Dolan Catherine and John Humphrey (2000): "Governance and Trade in fresh vegetables: The impact of UK supermarkets on the African Horticulture Industry", *Journal of Development Studies.* Vol37, Issue 2, December 2000, pp.147-176.

Dorward Andrew, Jonathan Kydd and Colin Poulton (2008): Traditional Domestic markets and marketing systems for agricultural products, Background paper for the World Development Report, Report No 41359

Ferto Imre and Gabor G. Szabo (2002): The Choice of Supply Channels in Hungarian Fruti and vegetable sector, Paper for presentation to the American Agricultural Economics Association 2002 Annual Meeting, Long Beach, California

Gorishnan, Shankar and Priya Sreenivasa (2009): "Corporate retail: dangerous implications for India's economy," *Economic and Political Weekly* 44(32), 480-85.

Hazell, Peter (2011): Five Big Questions about Five Hundred Million Small farms" keynote paper presented at the IFAD on New Directions for Smallholder Agriculture, 24-25 January 2011, International Fund for Agricultural Development Via Paolo Di Dono, 44, Rome 00142, Italy.

Heckman, J., Ichimura, H. & Todd, P. (1998): Matching as an econometric evaluation estimator, *The Review of Economic Studies , 65(2), 261-294.*

Humphrey (2007): Policy implications of trends in agribusiness value chains, *The European Journal of Development Research ,* 18;4, 572-592.

India Today (2007)Veggie Mart turns Smart. April 2, No paging http://www.indiatoday.com/itoday/20070402/business.html.

Kohli Rajeev and Jagadish Bhagawati (2011) Organized Retailing in India: Issues and Outlook, Columbia-NCAER Conference on Trade, Poverty, Inequality and Democracy, Paper 5, March31-April1,New Delhi, 2011

Lipton Michael (2006): Can small farmers survive, prosper or be the key channel to cut mass poverty? *Electronic Journal of Agricultural and Development Economics*, Vol.3.No.1. pp.58-85.

Minten Bart, Thomas Reardon and Rajib Sutradhar (2010): Food Prices and Modern Retail: The Case of Delhi, *World Development,* Vol, 38, No.12, pp.1775-1787

Minten and Reardon (2008): Food prices, quality and quality's pricing in supermarkets versus traditional markets in developing countries, *Review of Agricultural Economics, 30(3),* 480-490.

Minten Bart and Yasodhan Ghorpade (2007) : The tomato value chain in Jaipur: Insights in traditional marketing channels versus modern retail, IFPRI/MSU Joint Program on Markets in Asia, IFPRI New Delhi Office, Working Paper, June.

Narayanan Sudha (2014): Geography matters: Evidence and Implications of Spatial Selection in Contract Farming Schemes in Southern India, in Christy Ralph D, Carlos A da Silva, Nomathemba Mhlanga, Edward Mabaya & Kristina Tihanyi (2014) ed '*Innovative Institutions, Public Policies and Private Strategies For Agro Enterprise Development*, World Scientific Publishing Co Pte Ltd., *Forthcoming*

Neven, D., M.Odera, T.Reardon and H.Wang. (2009) "Kenyan Supermarkets and Emerging Middle Class Horticultural Farmers, and Employment impacts on Rural Poor", World Development. 37(11): 1802 -11.

Patnaik Gokul (2011): Status of Agriculture Reforms, workshop on '*Policy Options and Investment Priorities For Accelerating Agricultural Productivity and Development in India'* organized by IGIDR and IHD, November 10-11, New Delhi

Peterson H.Christopher, Allen Wysocki, Stephen B. Harsh (2001): Strategic Choice along the veetical coordination continuum, International Food and Agribusiness management review 4(2001) 149-166

Pritchard B, CP Gray and M Godwin (2010): "The impact of supermarkets procurement on farmer communities in India: Evidence from Rural Karnataka", *Development Policy Review,* Vol 28, No 4. Pp.435-56.

Reardon Thomas, C. Peter Timmer and Bart Minten (2012): Supermarket revolution in Asia and emerging development strategies to include small farmers, Proceedings from National Academy of Sciences, www.pnas.org/cgi/doi/10.1073/pnas.1003160108

Reardon and Minten (2011): The Quiet Revolution in India's Food Supply Chains, IFPRI Discussion Paper 01115, New Delhi Office, August 2011.

Singh Sukhpal (2011): "Controlling food inflation: Do supermarkets have a role?" *Economic and Political Weekly,* Vol XLVI, No 18, pp.19-22.

Reardon Thomas, Christopher Barrett, Julio Berdegue and Johan Swinnen (2009): Agrifood Industry transformation and Small farmers in developing countries, *World Development,* Vol.37, No.11, P.1717-1727.

Reardon, T.,Timmer, C.P., Barrett C.B. and Berdegue, J.(2003), "The rise of supermarkets in Africa, Asia and Latin America", *American Journal of Agricultural Economics,* Vol85,No.5, pp1140-6.

Reardon Thomas and Julio Berdegue (2002): The rapid rise of supermarkets in Latin America: challenges and opportunities for development, *Development Policy Review* 20(4): 371-388.

Reardon and Barrett (2000): Agroindustrialization, globalization and international development An overview of issues, patterns and determinants, *Agricultural Economics 23, 195-205*

Shah Amita(2011) : Retail Chains for Agro/Food products, Inclusive or Elusive, *Economic and Political Weekly,* Vol. XLVI,No33, August 13.pp. 25-28.

Singh Sukhpal (2011b): FDI in Retail: Misplaced Expectation and half truths, *Economic and Political Weekly,* Dec17, Vol. XLVI, No.51