THE CONSEQUENCES OF SMALL RICE FARM MECHANIZATION PROJECT

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FACTOR SHARE ANALYSIS
(Some Notes and Results)

by

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Two Approaches to Income Distribution Analysis

1. Functional income distribution (factors share).
2. Personal income distribution (earners share).

Definition

Functional income distribution refers to the allocation of income among factors of production. On the other hand, personal income distribution refers to the distribution of income among persons or resource owners.

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In this study, total income from rice production as represented by the value of output generated was allocated to each factor used in production, i.e., labor, land, capital and cash inputs plus a residual. Likewise, this income was equated to the sum of payments that went to the earners in the production process, i.e., hired laborers, landlord, hired capital, cash inputs and the farmer or the operator.

Assumption on Price Imputation

1. Imputed price for family labor. Average wage paid per hour to hired labor for all activities by village.
2. Imputed rent for owned land. Average rent paid by farmers for rented land per hectare by village.
3. Imputed rent for owned capital. Average custom rate of tractor/animal services per hour for all activities by village plus an interest of 15% on pre-harvest paid-out cost.
4. Imputed price for owned seed. Average price of seed per kilogram by village.

Estimated total costs and returns from rice production per hectare for the wet and dry seasons are presented in Tables 1 and 2. In the wet season, capital and labor costs represented the largest proportion of the total costs for all farm groups by level of irrigation and degree of mechanization. On the other hand, in the dry season, capital and cash inputs costs were the largest cost factors.

Total costs were generally higher in the dry season compared to the wet season. It was significantly higher in the pump-irrigated and rainfed farms compared to the gravity irrigated farms. However, there were no significant differences that were observed among farm groups with respect to the degree of mechanization. The reverse was observed for the wet season. Total costs were significantly higher in the gravity irrigated farms compared to the pump-irrigated and rainfed farms; and a slight significant differences were observed among farm groups with respect to the degree of mechanization. In general, it was higher in the mechanized farms compared to the non-mechanized farms except in the case of the pump-irrigated farms.

The value of total output was significantly higher in the irrigated farms as compared to the pump-irrigated and rainfed farms for both wet and dry seasons. However, there were no significant differences that can be observed in the degree of mechanization for both seasons.

The residual, which is the difference between value of total output and total costs, was found to have slight significant differences by level of irrigation and degree of mechanization. Generally, it was higher in the mechanized farms except in the case of the rainfed farms. In the dry season, it was significantly higher in the gravity irrigated farms compared to the pump-irrigated and rainfed farms. However, there were no significant differences by degree of mechanization that were observed.

I. Functional Income Distribution

The highest income share went to capital cost followed by labor and cash inputs for the wet and dry seasons. Land cost and the residual both have marginal shares in the distribution.

a. Share of capital cost. During the wet season, it was found to have slight significant differences by level of irrigation and degree of mechanization. No trend can be discerned on where it was lower or higher with respect to mechanization. However, it was generally higher in the mechanized farms compared to the non-mechanized farms.

On the other hand, for the dry season, it was significantly higher in the pump-irrigated and rainfed farms compared to the gravity irrigated farms. However, there were no differences that were observed with respect to degree of mechanization.

b. Share of labor cost. It was observed to be significantly higher in the rainfed farms for both the wet and dry seasons. With respect to mechanization, it was generally higher in the non-mechanized farms.

c. Share of the cost of cash inputs. In the wet season, it was significantly higher in the pump-irrigated and rainfed farms compared to the gravity irrigated farms. In the dry season, however, no significant differences were observed by level of irrigation and degree of mechanization.

d. Share of land cost. It had a modest share ranging from 10-30% for both the wet and dry seasons. There were no significant differences that were observed with respect to the level of irrigation and degree of mechanization for all farm groups.

e. Share of the residual. In the wet season, there were no significant differences that were observed with respect to both the level of irrigation and degree of mechanization. In the dry season, however, it was signifacantly higher in the gravity irrigated farms and lowest in the rainfed farms. With respect to the degree of mechanization, it was generally higher in the mechanized farms compared to the non-mechanized farms.

II. Personal Income Distribution

The highest income share went to the operator's share especially in the wet season ranging from 30-50 percent. However, it was not significantly different with respect to the level of irrigation and degree of mechanization among farm groups.

In the dry season, it also represents a major share in the income distribution but as equally important as the share of the cash inputs which was most pronounced in the rainfed and pump-irrigated farms. Likewise, the operator's share in the dry season was not significantly different across farm groups with respect to degree of mechanization and level of irrigation.

In the case of the hired labor and the landlord, their shares ranged from 17-22 percent and 0-13 percent respectively for both seasons and were not significantly different with respect to the level of irrigation and degree of mechanization across farm groups.

Among the earner shares that showed significant differences among farm groups were hired capitals' and cash inputs'. The share of hired capital was found to be consistently higher in the mechanized farms compared to the non-mechanized farms. There were, however, very slight differences that were observed by level of irrigation for both seasons. The share of cash inputs', on the other hand, showed significant differences only in the dry season. It was found to be significantly higher in the pump-irrigated and rainfed farms. However, no differences were found with respect to the degree of mechanization.

Table 1. Rice production costs and returns per hectare, wet season 1979-80, Philippines (Pesos/hectare).

Item	Gravity Irrigated			Pump Irrigated			Rainfed		
	Mechanized	Partially Mechanized	Non-Mechanized	Mechanized	Partially Mechanized	Non-Mechanized	Mechanized	Partially Mechanized	Non-Mechanized
A. Production Cost									
1. Cash inputs	978.94[a]	976.79[a]	834.55[ab]	-	490.66[cd]	676.52[bc]	-	407.52[d]	387.98[d]
2. Total labor cost	971.86[b]	997.04[b]	1241.98[b]	-	660.78[a]	699.67[c]	-	612.08[c]	623.23[c]
a. Family	137.94[b]	131.96[b]	680.52[a]	-	159.48[b]	232.52[b]	-	189.93[b]	251.59[b]
b. Hired	833.92[a]	865.08[a]	561.46[b]	-	501.30[bc]	467.15[bc]	-	422.15[bc]	371.64[c]
3. Total land rent	630.99[a]	586.82[ab]	470.05[cd]	-	565.98[ab]	541.24[bc]	-	424.18[d]	443.76[d]
a. Owned land	231.32[a]	223.56[a]	232.34[a]	-	339.33[a]	340.66[a]	-	357.53[a]	303.10[a]
b. Rented land	399.16[a]	363.26[ab]	237.71[bc]	-	226.65[bcd]	200.58[bcd]	-	66.65[d]	140.66[cd]
4. Capital	1241.51[a]	916.39[abc]	807.34[bc]	-	839.65[abc]	1172.88[ab]	-	540.98[cd]	378.37[d]
a. Owned	956.01[ab]	665.22[abcd]	763.66[abc]	-	617.15[bcd]	1063.40[a]	-	356.25[dc]	306.74[d]
b. Hired	285.50[a]	251.17[ab]	43.68[d]	-	222.50[ab]	109.48[cd]	-	184.73[bc]	71.63[d]
5. Total cost	3823.29[a]	3477.04[ab]	3468.22[ab]	-	2582.62[ad]	3083.57[bc]	-	987.50[dc]	1983.18[e]
6. Total paid-out cost	2498.05[a]	2456.31[a]	1780.31[b]	-	1470.01[bc]	1448.92[bc]	-	1091.16[dc]	971.41[d]
B. Total Output	4437.61[a]	4510.21[a]	3785.59[a]	-	2881.01[b]	2839.06[b]	-	2075.03[b]	2147.19[b]
C. Gross Value Added	3458.67[a]	3533.41[a]	2951.04[ab]	-	2390.35[bc]	2162.54[bc]	-	1667.51[c]	1759.92[c]
D. Gross Family Factor Income	1939.56[a]	2053.90[a]	2005.29[a]	-	1411.00[ab]	1390.14[ab]	-	980.01[b]	1176.49[b]
E. Residual	614.32[ab]	1033.16[a]	317.37[ab]	-	298.39[ab]	-244.51[b]	-	83.67[b]	312.72[ab]

*In a row, means followed by a common letter are not statistically different ($P < 0.05$), using Duncan's Multiple Range Test.

Table 2. Rice production costs and returns per hectare, dry season 1979-80, Philippines (Pesos/hectare).

Item	Gravity Irrigated			Pump Irrigated			Rainfed		
	Mechanized	Partially Mechanized	Non-Mechanized	Mechanized	Partially Mechanized	Non-Mechanized	Mechanized	Partially Mechanized	Non-Mechanized
A. Production Cost									
1. Cash inputs	1206.32[a]	1182.77[a]	1482.51[a]	-	1895.51[a]	1721.88[a]	-	1662.88[a]	1485.60[a]
2. Total labor cost	968.17[b]	1035.29[b]	1698.16[a]	-	944.29[b]	841.84[b]	-	765.01[b]	920.10[b]
a. Family	147.71[b]	161.71[b]	1178.49[a]	-	232.23[b]	279.94[b]	-	285.42[b]	376.18[b]
b. Hired	820.46[a]	873.58[a]	519.66[ab]	-	712.06[a]	561.90[ab]	-	479.59[ab]	543.92[ab]
3. Total land rent	639.57[a]	609.61[a]	491.23[a]	-	423.12[a]	555.82[a]	-	624.58[a]	604.99[a]
a. Owned land	179.44[bc]	296.78[abc]	323.63[abc]	-	314.86[abc]	457.97[ab]	-	624.58[a]	464.00[ab]
b. Rented land	460.12[a]	312.84[a]	167.60[a]	-	108.26[a]	97.85[a]	-	0[a]	140.99[a]
4. Capital	1517.05[c]	1042.53[b]	922.44[b]	-	11557.93[a]	12730.30[ab]	-	6515.29[ab]	9051.02[a]
a. Owned	1248.52[c]	692.05[c]	832.24[c]	-	11280.52[ab]	12517.03[a]	-	6333.19[abc]	8896.83[ab]
b. Hired	268.54[ab]	350.48[a]	90.20[bc]	-	277.41[ab]	213.27[abc]	-	182.10[abc]	154.19[abc]
5. Total cost	4331.11[b]	3870.21[b]	4594.34[b]	-	14820.85[a]	15849.84[a]	-	9567.77[ab]	12061.70[a]
6. Total paid-out cost	2755.42[a]	2719.67[a]	2259.98[a]	-	2993.24[a]	2594.90[a]	-	2324.57[a]	2324.70[a]
B. Total Output	4795.33[a]	4990.00[a]	4489.20[a]	-	4807.25[a]	4481.86[a]	-	3094.57[ab]	3656.74[ab]
C. Gross Value Added	3589.01[ab]	3807.23[a]	3006.69[ab]	-	2911.74[ab]	2759.98[ab]	-	1431.69[bc]	2171.14[abc]
D. Gross Family Factor Income	2039.89[a]	2270.33[a]	2229.22[a]	-	1814.01[a]	1886.96[a]	-	770.00[a]	1332.03[a]
E. Residual	464.22[a]	1119.79[a]	-105.13[a]	-	-10013.60[b]	11367.97[b]	-	-6473.20[b]	-48404.96[b]

* In a row, means followed by a common letter are not statistically different ($P < 0.05$), using Duncan's Multiple Range Test.

Table 3. Output shares, wet season 1978-80, Nueva Ecija, Philippines (%).

ITEM	Gravity-irrigated			Pump-irrigated			Rainfed		
	Mechanized	Partially mechanized	Non-mechanized	Mechanized	Partially mechanized	Non-mechanized	Mechanized	Partially mechanized	Non-mechanized
A. Factor Shares									
1. Cash inputs	25.12[a]	24.33[a]	23.07[a]	-	18.26[a]	26.00[a]	-	22.21[a]	21.08[a]
2. Labor	25.04[cd]	23.47[d]	36.31[ab]	-	28.45[abcd]	27.41[bcd]	-	34.71[abc]	38.54[a]
3. Land	19.12[abc]	14.96[bc]	12.94[c]	-	23.82[ab]	24.80[abc]	-	27.63[ab]	30.15[a]
4. Capital	36.13[ab]	23.21[b]	19.94[b]	-	32.53[ab]	51.25[a]	-	30.96[ab]	24.13[b]
5. Residual	-5.41[a]	14.03[a]	7.74[a]	-	-3.06[a]	-29.46[a]	-	-15.54[a]	-13.90[a]
TOTAL	100.00	100.00	100.00	-	100.00	100.00	-	100.00	
B. Earners Shares									
1. Cash inputs	25.12[a]	24.33[a]	23.07[a]	-	18.26[a]	26.00[a]	-	22.21[a]	21.08[a]
2. Hired labor	21.42[a]	19.89[a]	17.11[a]	-	18.53[a]	17.85[a]	-	22.55[a]	19.46[a]
3. Landlord	13.96[a]	8.71[a]	7.76[a]	-	9.21[a]	9.74[a]	-	3.68[a]	8.76[a]
4. Hired capital	7.76[abc]	5.97[bcd]	1.57[e]	-	8.93[ab]	3.95[cde]	-	11.66[a]	3.58[d]
5. Operator	31.74[a]	41.10[a]	50.49[a]	-	45.07[a]	42.46[a]	-	39.90[a]	47.12
TOTAL	100.00	100.00	100.00	-	100.00	100.00	-	100.00	100.00

* In a row, means followed by a common letter are not statistically different ($P < 0.05$), using Duncan's Multiple Range Test.

Table 4. Output shares, dry season, 1979-80, Nueva Ecija, Philippines, (%).

ITEM	Gravity irrigated			Pump-irrigated			Rainfed		
	Mechanized	Partially mechanized	Non-mechanized	Mechanized	Partially mechanized	Non-mechanized	Mechanized	Partially mechanized	Non-mechanized
A. Factor shares									
1. Cash inputs	29.67 ^{b}	25.61 ^{b}	32.92 ^{b}	-	41.70 ^{ab}	44.74 ^{ab}	-	60.62 ^{a}	47.33 ^{ab}
2. Labor	21.90 ^{b}	21.38 ^{b}	36.15 ^{a}	-	21.48 ^{b}	23.20 ^{ab}	-	28.80 ^{ab}	30.37 ^{ab}
3. Land	15.08 ^{b}	12.99 ^{a}	11.67 ^{a}	-	11.93 ^{a}	18.56 ^{a}	-	24.48 ^{a}	24.40 ^{a}
4. Capital	36.88 ^{b}	22.56 ^{b}	20.20 ^{b}	-	257.62 ^{a}	369.46 ^{a}	-	247.45 ^{a}	288.51 ^{a}
5. Residual	-3.53 ^{ab}	17.46 ^{a}	-0.94 ^{ab}	-	232.73 ^{bc}	-355.96 ^{c}	-	-261.35 ^{c}	-290.61 ^{c}
TOTAL	100.00	100.00	100.00	-	100.00	100.00	-	100.00	100.00
B. Earner shares									
1. Cash inputs	29.67 ^{b}	25.61 ^{b}	32.92 ^{b}	-	41.70 ^{ab}	44.74 ^{ab}	-	60.62 ^{a}	47.33 ^{ab}
2. Hired labor	18.23 ^{a}	17.96 ^{a}	13.36 ^{a}	-	16.43 ^{a}	15.02 ^{a}	-	18.65 ^{a}	15.06 ^{a}
3. Landlord	9.79 ^{a}	5.84 ^{a}	3.74 ^{a}	-	2.31 ^{a}	1.93 ^{a}	-	0 ^{a}	3.66 ^{a}
4. Hired capital	5.93 ^{ab}	7.41 ^{a}	1.87 ^{ab}	-	5.13 ^{ab}	4.64 ^{ab}	-	7.35 ^{a}	4.01 ^{ab}
5. Operator	36.38 ^{a}	43.18 ^{a}	48.11 ^{a}	-	34.43 ^{a}	33.67 ^{a}	-	13.38 ^{a}	29.94 ^{a}
TOTAL	100.00	100.00	100.00	-	100.00	100.00	-	100.00	100.00

* In a row, means followed by a common letter are not statistically different ($P < 0.05$), using Duncan's Multiple Range Test.