



Corruption, food subsidies, and opacity: Evidence from the Philippines

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ABSTRACT

We argue that subsidized food distribution systems that fail to publicize how much food has been allocated to each local market will experience high rates of theft on the margin as they are expanded. We provide the first comparable cross-section of estimates of subsidized food theft. As predicted, in regions of the Philippines that were allocated more subsidized rice to distribute, a larger percentage of the rice went missing.

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1. Introduction and theory

Governments in countries with high poverty rates have scaled up programs that distribute subsidized food in response to rising global food prices (Demekle et al., 2009). We are concerned here with the theft of subsidized food and its relation to program “opacity”. Specifically, program managers tend not to release information to consumers on how much food has been allocated for distribution in their local community. While it seems fairly obvious that this practice will tend to increase pilferage on average, our study advances a further concern. On the strength of theory and empirical estimates from a rice subsidy program run by the Philippines National Food Authority (NFA) in 2006, we argue that opacity also renders these programs ill-suited for rapid scaling up in the event of food price spikes. This is of concern because such temporary program expansions may become increasingly necessary to deal with more volatile food prices (Timmer, 2010).

Our theoretical model, adapted from previous contributions in public-finance (e.g. Reinikka and Svensson, 2004), demonstrates that the correlation between program inputs (allocations) and

outputs (subsidized food deliveries/consumption) will be low if those inputs are not publicized. While we must refer the reader interested in modeling details to our working paper (Mehta and Jha, 2012), the logic is simple. The model assumes, in keeping with information provided to us by the NFA, that consumer complaints are the key trigger for anti-corruption probes, and that these probes may lead to penalties. Agents decide how much to steal, taking into account that delivering less food at subsidized prices implies higher profits but also a higher probability of complaints. Consumers’ key incentive to complain is that a successful complaint results in a (possibly temporary) increase in subsidized rice deliveries due to closer supervision by the government. Increases to program inputs increase the probability that a complaint will be successful. However, if consumers must decide whether to complain or not without observing program inputs, expansions in inputs will not alter their prediction of the probability of a successful complaint. Expansions in inputs therefore do not alter consumers’ incentives to complain. Thus an agent who is given more food to distribute need not worry about a more animated response from consumers if they do not simultaneously increase deliveries. To coin an obvious term, this unresponsiveness of deliveries to inputs implies a high *marginal pilferage rate* in an opaque food distribution system.

Translating these public finance models to the food-security domain involves one additional twist. These models predict that

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more funds will be stolen in poor communities, given their lack of “voice”. We hypothesize that when subsidized food is an inferior good, the poor will value the increase in deliveries that a successful complaint brings more than the rich will, and so may have a greater incentive to complain when it is stolen. Pilferage may therefore be lower in poorer communities. Thus corruption could render the achieved distribution of program benefits *more* progressive.

To examine these predictions one requires point estimates of pilferage from a single program in different locations over time. Unfortunately, given the limited publication of program inputs, no previous study of a public distribution system has obtained such data. Most studies only provide a single aggregate estimate of theft. Cross-sectional information is available from India and Indonesia, but has limitations. *Olken's (2006)* measures of rice theft in Indonesia are underestimates: they assume that all recipients received their full quota. This is useful for understanding the scale of the problem, but not for examining the covariates of theft. Studies of India's public distribution system (PDS, references below) estimate theft at the state level. However, given significant differences in program implementation arrangements across Indian states, cross-state comparisons are poorly suited for understanding the effects of scale, market conditions or consumer characteristics.

Comparisons of theft over time are only available from India. *Jha and Ramaswami (2011)* estimate that when India increased foodgrain inputs to its PDS from 1.61 to 2.27 kg/(person-month) between the 1999/2000 and 2004/2005 survey years, consumption of subsidized foodgrains only increased from 1.01 to 1.03 kg/(person-month). *Khera's (2011)* data confirm this, showing dramatic increases in theft during this time in most states. *Himanshu and Sen's (2011)* data show that food-grain inputs doubled between 1993/4 and 2004/5 while output increased by only 2%. While consistent with very high marginal pilferage rates, even these comparisons are confounded by changes in targeting arrangements in the mid-1990s. Trends in inputs and outputs between 2004 and 2007 are similarly difficult to interpret due to concurrent increases in food prices.

Our empirical contribution is to provide the first reliable point estimates of theft from the same program in several locations. Notwithstanding a limited sample size and an absence of temporal variation, this is an improvement on the data available from previous studies in that it provides reliable estimates of theft at several locations under the same program.

Our case-study is well-suited to studying the scalability of an opaque program. Food allocations to local markets by the NFA in 2006 were not publicized to consumers, and consumer purchases were not officially rationed, implying that consumers had no reasonable means of forging expectations about program inputs. Additionally, our measure of scale – the per capita allotment of rice – varied significantly across regions, ranging from 5 to 25 kg/person-year. This said, the NFA reveals little about how it determined how much rice to send where. The only public statement we could find on this is that it is based on several variables, including “stock inventory, rice allocation, distribution target, supply/demand situation, commercial stocks and prices, etc.”¹ If a formula linking these variables to actual allocations exists, neither that formula, nor most of these variables, are publicly known. Thus, it remains possible that allocations were influenced by differences across locations in likely theft rates.

2. Data

We use four data sources. We estimate consumer expenditures on NFA rice from the Family Income Expenditure Survey, 2006. Dividing these expenditures by 18 Pesos/kg—the standard price of NFA rice—yields estimated consumption. The FIES sample represents 99.6% of the population, estimates most aggregate variables at the regional level with coefficients of variation of less than 5%, and employs a stratification scheme that ensures maximal representation of the population in terms of geography, livelihood, provincial government and community income (*Barceñas, 2004*). Our regional consumption estimates are therefore quite accurate. Three problems with the data are a 13.6% non-response rate, the 0.4% of the population that it does not cover, and some problems with data reliability in the National Capital Region (NCR), where a fire destroyed several surveys. We get around these problems by excluding the NCR from our analysis, and examining our estimates for robustness to systematic differences in NFA rice consumption between represented and unrepresented households.

We have two official sources on program inputs. The NFA provided us with a spreadsheet of NFA rice allocations by month in 16 administrative regions. These data are not normally publicly available, so we have access to information that consumers did not have. We aggregate these data to 13 regions, compatible with the geographic boundaries available in the FIES. We also use the NFA's official 2006 Accomplishment Report, which breaks up the amount of rice distributed that year by outlet type, though not by region or month. We use figures from this report to net out rice allocated to school feeding programs (5% of the total), which should not appear in household survey data. We do this under the assumption that food for schools accounts for the same percentage of rice allocations in all states.

Finally, provincial data on regular rice prices come from the Bureau of Agricultural Statistics' CountrySTAT database.

3. Results

We estimate that 14.16 kg/person were allocated for distribution, and that 7.29 kg/person (with a standard deviation, adjusted for clustering, of 0.26 kg/person) reached consumers. At a point estimate, this implies that 48.5% of the subsidized rice allocated did not reach consumers through official channels. This suggests that pilferage roughly doubled the cost of transferring a peso of subsidy to consumers. *Fig. 1* provides 95% confidence intervals for estimates of pilferage by region. The wide range of estimates and non-overlapping intervals suggest that generic reporting errors, which should have similar effects in all regions, do not account for the missing rice. In our working paper we have also developed robustness tests, which show that three different types of recall biases, three sources of sampling error and two types of under-reporting error cannot account for it either.

The large variations in pilferage rates evident in *Fig. 1* motivate further analysis of their causes. While small sample sizes will certainly obscure subtle patterns, *Figs. 2* and *3* suggest that the patterns involved are not particularly subtle.

As expected, *Fig. 2* shows a very slight relationship between allocations and deliveries. Indeed, the slope coefficient shows that on average, a one-kilogram difference in allocations is associated with only a 240 g difference in deliveries. This low partial correlation suggests a very high marginal pilferage rate (76%, under an overly literal interpretation).² The slope coefficient is

¹ NFA Distribution Flowchart. <http://www.nfa.gov.ph/image/distribution.jpg>. Accessed 3 June, 2009.

² Such an interpretation would be overly literal because if allocations are designed to facilitate theft, they may well be endogenous to deliveries. This said, correlations between allocations and all of our explanatory variables are insignificant at the 5% level.

Table 1
Determinants of estimated consumption across 13 regions.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per capita rice allotment to region	0.24 (0.19)	0.19 (0.16)	0.24 (0.15)	0.26 (0.23)	0.27 (0.19)	0.19 (0.15)	0.21 (0.16)
Poverty headcount index		17.45* (7.22)					
Regional income per capita ('000s of Pesos/year)			-0.36* (0.15)	-0.40* (0.16)	-0.37* (0.16)		-0.19 (0.22)
Retail price of regular milled rice—average for 2006				-0.75 (1.38)			
Wholesale price of regular milled rice—average for 2006					-0.30 (1.41)		
Total regional population (in millions)						-0.89* (0.34)	-0.56 (0.51)
Constant	4.31 (3.20)	-1.00 (3.46)	14.5* (4.89)	31.3648 (31.22)	20.25 (26.63)	10.12 (3.40)	13.21* (4.98)
R-squared	0.139	0.457	0.466	0.484	0.469	0.491	0.530

Note: dependant variable is annual subsidized rice consumption per capita (kg/person). Standard errors are in parentheses. All regressions use 13 regional observations.

* Significant at 5%.

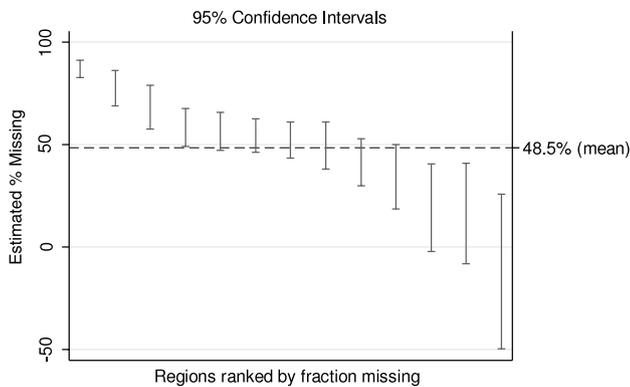


Fig. 1. Missing rice by NFA region. Note: National Capital Region excluded. Source: Authors' calculation from FIES and official NFA distribution data.

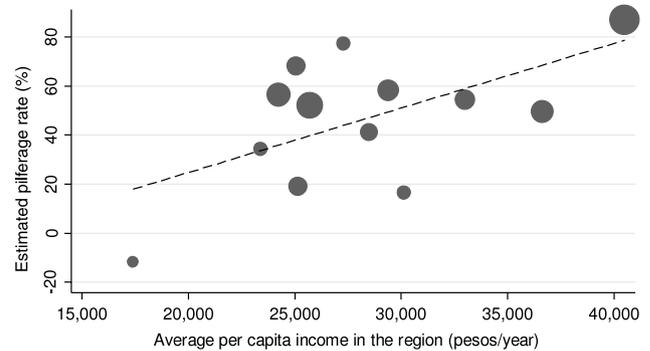


Fig. 3. Poorer regions experience less pilferage. Note: data from 13 NFA administrative regions, excluding the national capital region. Allotments are from official records. Consumption is estimated from FIES data. The dashed line is the regression line. Size is total NFA rice distributed to the region.

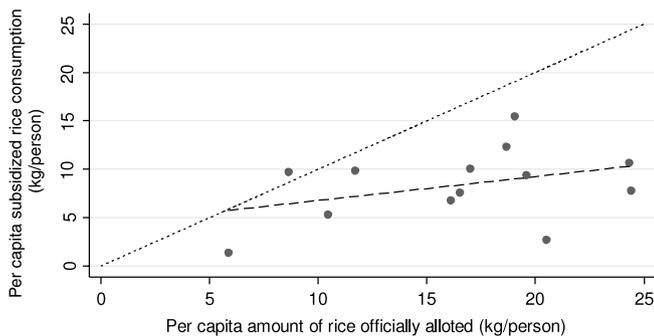


Fig. 2. Per capita consumption and official allotments of NFA rice. Note: data from 13 NFA administrative regions, excluding the national capital region. Allotments are from official records. Consumption is estimated from FIES data. The dotted line is $y = x$. The dashed line is the regression line.

not significantly different from zero, but is significantly less than one. The regression coefficients in Table 1 confirm that adding controls for prices and regional incomes does not alter this conclusion. Deleting one outlier at a time and/or weighting regions by population do not alter the conclusion either (not shown, for brevity).

Fig. 3 confirms that, in contrast to the evidence on the theft of public funds (Reinikka and Svensson, 2004), less subsidized food is stolen in poor regions. This may, as our theory proposes,

reflect the fact that subsidized rice, unlike cash, is an inferior good. Table 1, specifications 2–5, confirm this impression: *controlling for allotments*, regions with higher poverty rates and lower per-capita income levels receive more subsidized rice. Indeed, according to the R-squared statistics, these income variables account for more variation in subsidized rice consumption than allotments and local rice prices combined. Unfortunately, the correlation between per-capita incomes and population is high (0.73), reflecting high migration rates from poorer to richer regions of the Philippines. This colinearity makes it difficult to disentangle the effects of income from those of population (specifications 6 and 7). The explanatory power of local income and population does not decline when we switch to a specification in which the dependent variable is the regional pilferage rate. The relationship also survives the deletion of outliers. We caution that this result may not translate to other political environments.

4. Conclusions

Growing food insecurity demands a robust public response—one that can be scaled up rapidly. Our theory suggests that opacity is a serious impediment to program scalability. While top-down inspection regimes and grievance mechanisms certainly help to contain corruption and the NFA did have such procedures in place in 2006, the correlation between program inputs and outputs was nevertheless remarkably low. This relationship needs to be examined in the context of other food distribution systems. The key impediment to such investigations is the very opacity that

motivates our investigation in the first place. Publishing data in real time on how much food was sent where is therefore a critical step that governments attempting to revamp and expand their distribution systems must undertake. It may also be the cheapest anti-corruption program on the table.

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