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Three Interventions in the Rice Market in Haiti



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Haiti Priorise

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Policy abstract

In this paper we consider three approaches to improve the productivity of rice farmers in Haiti, without disadvantaging poor consumers:

1. Raising the tariff on rice imports
2. Subsidizing fertilizer
3. Introducing crop insurance

Reintroducing import tariffs to protect domestic producers and reinvigorate the farming sector is supported by a number of commentators. However, we show that such an intervention in the case of rice is economically unattractive: we have to assume unfeasibly high boosts to yield to achieve a BCR even modestly above unity.

The poor yields experienced by rice farmers in Haiti could be increased by making nitrogen fertilizer available to farmers at an affordable price. Subsidizing the cost of fertilizer by 50% is shown to boost production and makes economic sense: the BCR is a healthy 3.6 or more. The caveat is that in the absence of programs to build longer-term productivity, the benefit is unsustainable without continued subsidies.

A third option is to introduce a crop insurance scheme to compensate rice farmers in years in which their yield falls below the average for the area. This we assume to increase harvests by 10% because of farmers greater willingness to take risks, and such insurance provides a steadier income for them in years when the harvest is poor. If this assumption is true, the benefits of such a scheme outweigh the costs.

In summary, the two policy interventions we can recommend are to subsidize nitrogen fertilizer for rice farmers and to provide some form of insurance against crop losses.

Haiti Agriculture

Haiti is an agricultural country with a large and poor rural sector. Much of the population is below the poverty line and the unemployment rate is high.¹ According to the World Bank (www.worldbank.org/en/country/haiti/overview), Haiti remains the poorest country in the Americas and one of the poorest in the world; the GDP per capita was just \$846 in 2014. This dire situation is compounded by a very high level of economic inequality, with a Gini coefficient of 0.61 in 2012. GDP growth was only 1.2% per annum in 2015 and was projected to fall to 0.8% the following year. In addition, international aid fell from 16.5 to 5.3% of GDP from 2011 to 2015.

Many of the country's problems can be put down to poor governance and political uncertainty. Most recently, the country faced over a year of political crisis, with President Martelly's chosen successor, Jovenal Moise, finally elected in January 2017 and sworn in the following month. Corruption is rife, with Transparency International ranking the country number 159 out of 176 in its 2016 Corruption Perceptions Index.

Against this background, agriculture at present represents a lifeline for millions of Haitians, but offers little in the way of progress towards a more secure life. Natural catastrophes have had an enormous impact on rural life, whether from drought, earthquakes or hurricanes (most recently, hundreds of people died in Hurricane Matthew in October 2016, causing a further postponement of planned presidential elections). Designing a path forward for the agricultural sector of Haiti is a formidable challenge but one that has significant payoff. The sector has the potential as a competitive exporter of agricultural products as well as providing staple commodities for the domestic market. With few other sources of potential economic growth, agriculture will remain a key sector for many years to come.

This priority suggestion – to improve domestic rice production and availability – addresses one of the many problems facing Haitian agriculture. The rice sector has performed poorly in recent years with stagnant yields and a declining share of the domestic market. The rice market has become a political as well as an economic problem, a reminder to many of the stresses incurred

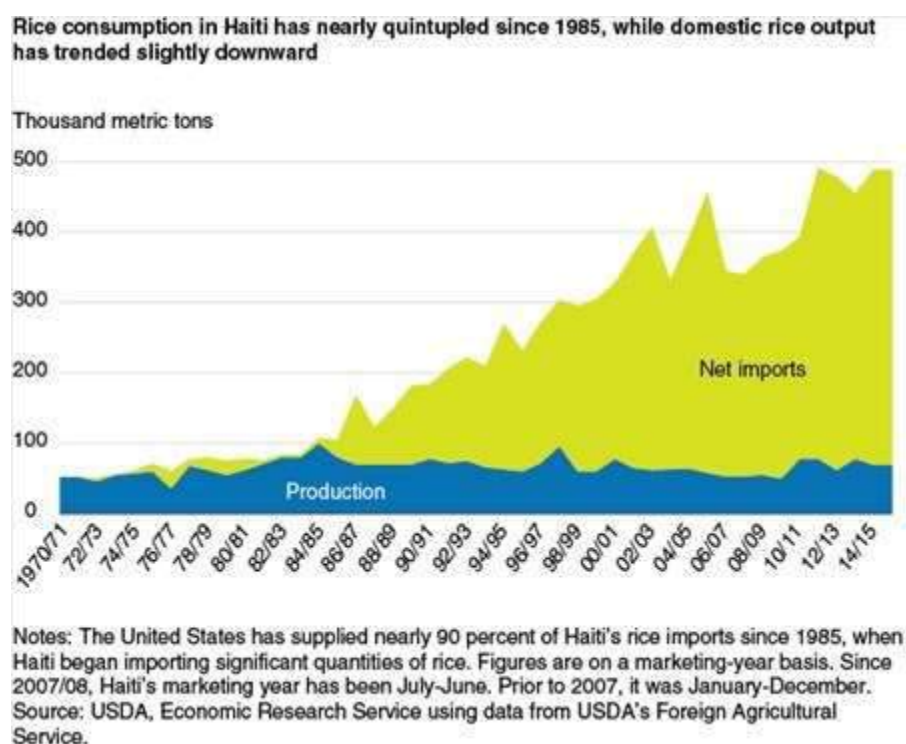
¹ Some 55 percent of the population survive on less than US\$1.25 a day, and unemployment has been estimated at 40 percent. Two thirds of the population are thought to work in the informal sector (WTO, 2015).

at the time of structural adjustment of the economy twenty years ago. Any intervention that brought steady progress to the rice sector would have significant benefits.

Haiti Rice

Rice has been produced in Haiti for over 200 years but was consumed as a dish for Sundays and special occasions. Consumers chose corn and millet as a less expensive form of carbohydrates than rice. Until the mid 1980s Haiti was self-sufficient in this staple food. Haitian rice is a long-grain variety, with two seasons a year: April/May and October/November. Some mountain rice is grown mostly for home consumption in the North and North-East areas. Swamp rice is planted primarily in irrigated fields in the Artibonite Valley, and supplies the urban areas.² Other rice growing areas are in the North and South regions. Haitian rice is considered to be of high quality, but production has stagnated in recent years. Imported rice now makes up a large part of domestic consumption, although the perception is that this is of lower nutritional quality (see Figure 1).

Figure 1: Rice Production and Imports, 1097/71 to 2014/15



² The Artibonite Valley accounts for about 70 percent of the nation's rice crop.

The “Rice problem” in Haiti has two main components. On the production side, stagnant domestic yields have made this rice expensive relative to imported rice. The relatively low yields are generally attributed to problems of farm structure and farm management. Many farms are small and fragmented, making mechanization and modern crop husbandry methods impractical. Farmers face many difficulties in accessing fertilizer as a result of price and supply constraints and there is a general lack of appropriate information on proper fertilizer usage (USAID, 2012). Rice farmers suffer from the poor infrastructure of the rural areas and from inadequate credit facilities.

On the demand side the rice needs of the urban population have increasingly been met by imports. Rapid population growth and the increasing migration to urban centers contributed to the inability of domestic rice production to keep pace with demand. Until the mid 1990s the tariff rate on imported rice was 35 percent. The rice tariff was reduced to 3 percent as a part of a structural adjustment suggested by the IMF and the World Bank, with the support of the US. The low tariff allowed US rice (known locally as “Miami rice” after the port from which it is commonly shipped) to be imported in considerable quantities and soon overtook the level of domestic production (Figure 1). The level of the rice tariff has been a source of contention since that time, with many groups arguing for reinstatement of a tariff. But the GOH is naturally concerned that a price rise for rice could lead to political tensions, as happened in several countries in 2008. City-dwellers rely on affordable rice as a staple foodstuff, and increasing import tariffs may need to be accompanied by an offsetting food subsidy.

Haiti has a relatively liberal trade regime, with rice import tariffs now the lowest in the Caribbean region. Liberalization has led to the reduced price of food, which is of benefit to the urban population. However, what may be good for urban consumers is a challenge for farmers and the rural economy, in the absence of alternative value-added activities. With over 40% of Haitians living in the countryside, this is a significant social and economic problem.

Although trade liberalization is often blamed for having a major impact on rice cultivation, data on rice output does not show any particular change in trend in the mid 1990s (see Figure 1).

Environmental degradation has had a major part to play. Forests were cleared for sugar plantations during colonial times and, following independence, farmers have sought to maximize short-term yields without considering sustainability. The result has been extensive soil erosion, with a vicious cycle of attempts to increase yield leading to even lower yield potential in the longer term (Thomas-Hope, 2001). Subsistence farmers of mountain rice, as well as farmers in lowland regions, suffer from continued soil degradation and cannot afford the necessary inputs to increase their yields and help to make farming more sustainable.

The problems in the rice sector are complex and interrelated. Against this background, agriculture remains a primary way to improve the economic wellbeing of families, if ways can be found to make practices more efficient and profitable.

Policy options

Improving the competitiveness of Haitian rice has been discussed for several years. There are several options for generating higher incomes to rice farmers.

- One option is to buy rice from farmers at a fixed price that is above the price of imports. This option places a heavy burden on the ability to monitor and implement such a scheme. It is unlikely that the government of Haiti (GOH) could afford to purchase all domestic rice and sell it at a price that is competitive with imports.
- Another approach would be to subsidize rice producers directly, through cash payments or other liquid funds. Given the overwhelming fiscal problems of the GOH this is essentially impracticable. It is also likely to be politically difficult to give subsidies to rice farmers but not producers of other products. And the degree of monitoring of such payments if in cash form could prove daunting.
- Another option is to protect the rice market by imposing restrictions on imported rice. This can be done by imposing a tariff at the border or restricting imports by quantitative controls. Quantitative controls lend themselves to circumvention and the capture or rents by those who receive licenses to import. Tariffs are usually a better way to limit imports as the machinery for taxing goods at the border is already in place. The arguments for and against tariffs are discussed below.

- More feasible is to subsidize the price of inputs such as fertilizer or fuel. Some of the same administrative problems exist with subsidies as with direct payments. The GOH has attempted on several occasions to subsidize fertilizer, but has not been able to settle on a method of influencing the distribution of fertilizer that benefits the farmers directly and encourages proper usage. This option is discussed below with suggested modalities for distribution.
- More recent policy interventions in certain countries (in particular the US) have involved systems of crop insurance, to offset the impact on farm incomes of fluctuating yields and encourage investment in better farming practices. The government encourages the offer of insurance to farmers at a rate that is attractive by means of subsidies to crop insurance companies. Though this has not been widely tried in developing countries the need for some form of risk sharing may actually be greater among poorer farmers, who have less in the way of alternative sources of income.

Both government purchase of the rice crop for reselling and direct subsidy of rice producers can be ruled out as workable policy options to improve the competitiveness of the sector. This leaves the last three options for priority action in Haiti to revitalize the rice sector. Below, we consider each in turn: Raising the tariff on rice imports; Subsidizing fertilizer to rice farmers; and Introducing crop insurance to manage some of the risk faced by farmers.

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Intervention 1: tariff on rice imports

Theoretical impact of a tariff

The analysis of the impact of a tariff is well established in the international trade literature (Corden, 1971). Imposition of a tariff raises the price paid by the importer who presumably passes this on down the marketing chain: the marketing chain is likely to pass the full cost to the consumer unless there is significant competition among retailers involving price cutting. The market price increases accordingly, and domestic producers stand to gain if they are supplying the same markets. If the tariff does not have an impact on the world price, domestic prices should rise by the full extent of the tariff. The removal of a tariff sets the process in reverse. The importer does not have to pay the tariff and hence the price on the domestic market is reduced by a corresponding amount, to the benefit of consumers and to the cost of farmers.

Tariffs effect transfers from consumers to producers and to government revenues. But the economic cost to the economy is the distortion that occurs when consumers and producers alter their behavior: consumers cut back on consumption of that good and producers expand their production. The result is an economic loss as the gains from trade are reduced. These economic losses are calculated below in the case of a rice tariff. However, there are a number of caveats that need to be addressed in evaluating a tariff change.

Though the literature tends to treat tariff increases as symmetrical with tariff decreases, in practice there are important differences. A tariff decrease leaves the distribution sector a windfall that should in theory find its way back to the consumer via the retail chain. But the process assumes a reasonable degree of competition in the supply chain. Such an assumption may not be reasonable for Haiti. Much of the benefit of a tariff reduction could get captured before the consumer stage. However, a tariff decrease will probably reduce farm gate prices by an amount similar to the tariff decrease as there is no incentive for wholesalers to purchase domestic rice at prices higher than they pay for imported rice, whatever price the final consumer may pay.

A tariff increase has different problems. An increased tariff gives no benefit to the marketing chain. The distribution sector has a strong incentive to recoup the tariff that importing firms have had to pay. Passing it on the wholesalers and retailers in full would be expected, so consumers tend to feel the full extent of the tariff increase. Producers should benefit but in this case the functioning of the domestic supply chain can delay or offset this benefit. Although the wholesaler will want to purchase domestic rice rather than more expensive imported rice the infrastructure may delay the response. And if farmers have imperfect information of prices and market conditions, and in any case have to sell their rice directly after harvest in the absence of storage facilities, one can imagine the farmer not getting the full benefit of the tariff increase.

Practical Impacts

The difference between tariff reductions and tariff increases is directly relevant to Haitian conditions. The tariff cuts of the 1990s may have had less than expected impacts on consumer rice prices. There are a small number of firms that import rice, and the GOH issued licenses for such imports.³ It would not be surprising if the firms in the distribution channels benefited from the tariff cut. The price to consumers apparently did fall enough to make imports attractive, but producer prices also fell by a significant amount. Adjustment costs thus fell on producers who were in a poor position to react to the new price structure. Hence the prevailing view that rice producers took the brunt of the tariff reforms of 1995. The challenge for those suggesting a tariff increase is (a) how to prevent the negative impact on poor consumers of higher prices for staple food, and (b) how to ensure that the benefits actually get through to farmers.

Examination of a tariff intervention

The intervention examined here is a 20 percent tariff imposed on imported rice for a period of ten years. This is still lower than the 35% in place before the 1995 trade liberalization took place.

³ The importing firms include Tchako, S.A. that has commercial ties with Riceland, a large rice marketing company in Arkansas. This has led some to conclude that the rice imported into Haiti is subsidized by the US Government (Oxfam, 2012). Payments to US rice farmers are significant but that does not necessarily mean that rice to Haiti is sold at a price lower than obtains in other export destinations. And explicit export subsidies have essentially been phased out of US and other developed country farm policies in accordance with the terms of the WTO Agreement on Agriculture.

The tariff would be reduced in year seven, and be phased out by year ten.⁴ The following assumptions were made:

- In the base year 80,000 tons of rice were produced
- Consumption of rice was 500,000 tons
- The price of rice at the border was \$1,415 per ton
- Production increased in the absence of the tariff by 1 percent a year
- Demand under these conditions increased by 2 percent a year
- The world price for rice increased by 2 percent a year
- The elasticity of supply with respect to price is 0.5
- The elasticity of demand with respect to price is -0.25
- A 20 percent margin between import and retail price accounts for the cost of marketing
- A 15 percent margin between farm price and import price accounts for producer marketing costs.

The impact of the tariff under these assumptions would in the first year increase rice farmers' returns by \$31.7 million, and increase consumers' costs by \$124 million. The government would collect \$114 million in tariff revenue. The impact is similar for subsequent years, declining as the tariff is reduced (Table 1).

While the farmers and government would benefit, this intervention would do little to change the balance between domestic production and imports. By 2022, the last year of the proposed 20% tariff, the projected output of Haitian rice would be 93,400 tons, compared to the expected harvest of 84,900 tons in the absence of import tariffs. By 2026, when the tariff would have been removed, domestic rice output under both scenarios would be just 88,400 tons. In the meantime, rice imports would continue to increase and even after six years of the full 20% tariff, would be only about 19,000 tons lower than the tariff-free situation. By 2026, total imports in either case would have increase to 609,500 tons. This intervention may have had some short-term benefit for farmers, but would not be expected to change the longer term position at all.

⁴ The base year is labeled as 2016 in the tables, but is not intended to be taken as a prediction of actual conditions in 2016 for which data is not available. The tariff would start in 2017 and be removed by 2026.

Calculation of the Cost/Benefit ratio

The costs and benefits are calculated from the results of the tariff in Table 1. Consumers lose as a result of the higher prices by the reduction in consumer surplus (the value to consumers over and above the cost of purchasing rice.) In the first year of tariff introduction, consumer expenditure rises by nearly \$124 million in total. Producers gain \$31.7 million by an increase in producer surplus (the income to producers over and above purchased inputs). Consumers transfer the amount of the tariff revenue to the government (\$114 million in year 1), but that does not constitute an economic loss.⁵ These amounts increase in line with growing consumption and price inflation while the tariff is in place, then decline to zero as the tariff is phased out.

The ratio of benefits to costs is shown in Table 2(a): costs are high relative to benefits, implying that taxing imports of a staple good in order to benefit farmers can be an economically dubious proposition. Over the full period the tariff is in place (including the phasing-out period) the loss of consumer surplus amounts to \$1.24 billion, partially balanced by a gain in producer surplus of \$202 million. The overall benefit-cost ratio is just 0.16, making this a very unattractive policy.

One way to make the tariff less burdensome to consumers is to return the tariff revenue in the form of a consumer subsidy. This could be targeted towards low income consumers to meet a goal of social programs. Such a modification would change the cost-benefit calculation considerably. The calculations are shown in the lower rows of Table 2(a) below. The total transfer of tariff revenue to consumers over the ten-year period of tariff operation amounts to \$996 million, reducing the net consumer cost to just under \$240 million. The costs still exceed the benefits but by a smaller amount. As a consequence, the Benefit Cost Ratio (BCR) is close to one; although this is still not an economically attractive intervention, it cannot necessarily be simply ignored if there were overwhelming political considerations in favor of a tariff.

It is possible that the higher rice price could encourage farmers to change their farming practices and achieve higher yields. To see whether this additional benefit would make the tariff

⁵ The cost of administering the tariff is not included in these calculations. As imports are subject to various taxes the additional burden of collecting a tariff may not be high.

intervention more attractive, the yield of rice was increased by 10 percent when the tariff was in place. The results are shown in Table 2(b): BCRs edge up and are close to one, as the extra rice production offsets the economic losses from resource misallocation and consumer spending distortion.

Clearly, benefits rise as yields increase. However, assuming a 20% yield increase only makes this a break-even policy in economic terms: there is no value added. In the unlikely event that yields could be doubled, the additional producer surplus would rise from \$24.5 million in the base case scenario of a 10% yield boost to \$95.6 million. The net cost to the consumer also increases, to \$55 million so, even under this highly optimistic scenario, the benefit-cost ratio is a modest 1.74.

Policy recommendation

Tariffs on staple foods have a negative impact on consumers, hitting the poorest families hardest. Such policies might be justified if the benefit to farmers and their families was large enough, but for a good that is largely imported the burden on consumers is bound to outweigh the benefits to farmers. The tariff can be accompanied by food subsidies that return the tariff revenue to consumers. The calculations above indicate that without such a parallel system of subsidies the costs far outweigh the benefits of this intervention. The combination of tariff and food subsidy essentially mimics the impact of “deficiency payment” by which a payment is made to farmers over and above the return from the market, so farmers can get the benefit with no cost to consumers. However, the logistics of instituting a deficiency payment policy are difficult. Identifying and paying rice farmers requires considerable prior documentation and verification. In a state such as Haiti, with poor governance, political instability and high levels of corruption, the likelihood of efficient implementation of such a system is very low. The advantage of raising domestic prices through a tariff is that the administrative framework for taxing imports is already in place. However, we can conclude that this is not an economically attractive way forward.

Intervention 2: Subsidy on fertilizer used for rice production

Theoretical considerations

A subsidy on a farm input will normally cause farmers to use more of that input and possibly substitute it for other inputs. The benefits accrue to farmers to the extent that yields increase. There is an economic cost to the extent that the price ratio between inputs is distorted. However, if that input is being used to a suboptimal level without the subsidy then the distortion can be beneficial.

The most common inputs that governments subsidize to individual farmers are fuel and fertilizer.⁶ Subsidies on fuel are difficult to justify on distributional grounds: large farmers will tend to be the largest beneficiaries, and administratively the monitoring of such a commonly used input can be a problem.⁷ It is somewhat easier to focus a subsidy on a product that is more specific to agriculture. The intervention chosen for analysis here is the rationalization of a subsidy on fertilizer specifically for the production of rice.

In theory the lower price of fertilizer should cause farmers to increase its use whenever the marginal revenue from extra production exceeds the marginal cost of the fertilizer. Any inputs that are a substitute for fertilizer would be in part replaced though in the case of fertilizer there are no obvious substitutes. Any complementary inputs would be increased, and this could include herbicide and pesticide inputs as well as additional labor for spreading the fertilizer. Yield increases would also incur extra harvesting costs, but extra revenues could allow access to credit and purchase of mechanical aids. A virtuous cycle could be started with the increased yields, including more reliable marketing of the rice post-farm.

Even when the problem is identified and policies put in place the results are not as straightforward as would be suggested by the theory. The lack of access to fertilizer has been widely recognized by agencies that have addressed the problem. "Agricultural sector growth cannot occur without adequate provision and use of modern agricultural inputs like fertilizer,

⁶ Subsidies to water and electricity are also common, depending on the specific conditions of the agricultural sector. Large scale infrastructure projects are vital to all agricultural sectors and are often of benefit to other sectors as well. Accordingly, the suggested intervention is limited to one specifically targeted at the rice sector.

⁷ Many countries have reduced the price of fuel to farmers by exempting them from taxes. The incentives for diverting some of the tax-free fuel suggest the need for close monitoring.

supplied at cost-effective prices to farmers” (USAID, 2012). Fertilizer subsidy policies (FSP) have often been introduced in Haiti in the past with inconsistent impacts. The subsidies were introduced first in the 1980s and at the end of the 1990s the policy attracted support under a 10 year agreement by the Japanese Government (KRII program). The fertilizer was sold to farmers at a subsidized price 70-80 percent of the market price with the subsidy element declining over the decade. The USAID report (2012) was skeptical about the effect of the FSP:

The expected result of the subsidy program was to increase agricultural production. However, in spite of the subsidy, the production increase has been marginal. In fact, cereal yields declined consistently between 1990 and 2010. The slight increase in production has been attributed to the FSP, encouraging the GoH to revamp the FSP with additional fiscal funds in 2009 and with donations from the government of Venezuela in 2010. Nevertheless, due to the ad hoc erratic approach of the GoH in the implementation of the FSP as a result of fiscal constraints and the lack of a clear policy and strategy, it is difficult to attribute any increase in overall production to the subsidy program or associate it with an increase in fertilizer consumption.

Much of the problem revolves around the nature of the distribution system for fertilizer in Haiti. The USAID study examined the function and conduct of the fertilizer market in Haiti. This resulted in some suggested improvements in the programs surrounding the distribution of fertilizer (the WINNER program) that will be referred to below.

We consider here a subsidy of 50% of the market price of urea for five years, thereafter declining by 10% increments to zero in year 10.⁸

Practical issues

It was mentioned above that yields of rice have been stagnant in Haiti for some time. In fact, yields have been around two tons per hectare for two decades. The calculated average since 2005-6 is 1.83 metric tons per hectare, only about one-half of the global average, though yields have inched upwards in the last decade. Haiti also compares poorly with other countries in the region. For example, the Dominican Republic – occupying the eastern part of the same island – achieves yields averaging 4.85 tons per Ha and is the leading exporter in the region. Cuba records rice yields of 2.94 tons per Ha. In the WINNER program yields of 4 tons per Ha were

⁸ Urea is the most common form of nitrogen fertilizer, having largely replaced ammonium nitrate.

achieved, under supervised conditions, giving hope that the rice sector could be rescued from its current decline with appropriate interventions (data from ERS, 2016).

There are various factors that contribute to low yields of any crop but, given adequate water availability and reasonable control of pests and weeds, nitrogen availability is a crucial one, particularly for the depleted, eroded soils of a country such as Haiti. Getting fertilizer to the farmers and encouraging its efficient use could give a major boost to the sector. That alone may not be anywhere near enough to move the country back to a position of self-sufficiency, but it would be an essential plank of any effective policy in the long term.

Examination of a fertilizer subsidy intervention

To quantify the possible impacts of a fertilizer subsidy on rice production and farm income it is necessary to make some assumptions. These can be summarized as follows:

- Current use of fertilizer on rice crops is 750 tons (averaging about 13 kg/ha). For comparison, recommended nitrogen use for rice in Cuba by the FAO is 138 kg/ha, or about 300 kg/ha of urea.
- The price of such fertilizer (nitrogen, in the form of urea), assumed as \$48 per ton at the start of the intervention
- The average yield at the start of the intervention is 2.54 tons/Ha, building in recent yield increases
- The area under rice cultivation that is suitable for fertilizer application is 56.6 thousand hectares
- More fertilizer would be used as the subsidy kicks in: the elasticity of fertilizer use to fertilizer price is set at 0.96
- Rice yields would increase as more fertilizer is used: the elasticity of rice yield with respect to fertilizer use is set at 1.11.
- The subsidy would amount to 50 percent of the fertilizer price in years 1-5, and be phased out from year 6 to year 10.

In addition, some trends are built in to the counter-factual situation:

- There would a 3 percent growth in fertilizer use in the absence of the subsidy

- Fertilizer prices would rise by 1 percent a year in the absence of the subsidy
- Rice yields would rise by 2 percent in the absence of the subsidy
- The area under rice would increase by 1 percent a year
- There would be a 2 percent increase in the rice price annually over the period.

The results of applying these assumptions are shown in Table 3. In the first year of subsidy, fertilizer sales would rise from 750 to 1,132 tons, while the total cost to farmers would fall from \$36 million to \$18.6 million. Meanwhile, farm receipts from additional rice sales would increase by 53 percent, as the rice harvest increases from 147,000 tons to 225,000 tons. If the lower cost of subsidized fertilizer is added to that, farmer net profits (gross margin) would increase by 75 percent. The yield would rise to around 4 tons per hectare, in line with that in the DR and obtained in Haiti under the WINNER program.

Calculation of Cost/Benefit ratios

The calculation of the costs and benefits is shown in Table 4. The costs are the financial outlay on the subsidies (\$27.4 million in the first year) and the cost of the extra fertilizer used (\$8.8 million). The benefits are primarily the value of the extra rice produced (\$112.6 million) and the reduction of the cost of fertilizer (\$18.6 million). The benefit cost ratio is thus a healthy 3.6. This increases somewhat to 4.0 by the end of the program. Over the life of the subsidy programme, the costs rise, but benefits rise faster. As for the longer run, once the fertilizer subsidy has tapered to zero, no further benefit accrues. This policy gives a short-term boost, but offers no longer-term improvement to the lot of rice farmers, unless the extra income they receive can be invested in further projects that would be sustainable without continuing subsidy. This is outside the scope of the present paper.

Certain qualifications need to be added at this point. First, the assumption behind a fertilizer subsidy is that fertilizer is being underused. Although this has often been claimed for Haiti, the best rate of fertilizer application is often not known for the different types of soil and climate in the country. Correct usage can double yields but fertilizer can also be wasted under the wrong conditions. To be most effective, this policy would need to be complemented by the advice of expert agronomists. This would come at a further cost, but this could be outweighed by the

additional benefit. Secondly, the porous border with the Dominican Republic means that any difference in fertilizer price between the two countries can be arbitrated by entrepreneurs willing to face the cost and risks. Haitian farmers may still gain from the fertilizer subsidy if they sell the input to traders but they will not gain from the additional rice production.

Policy recommendation

Fertilizer subsidies in situations where such fertilizers are significantly under-used are likely to be attractive as a policy intervention. An Arkansas Extension Bulletin states the importance of fertilizer to rice yields in an unequivocal way:

Nitrogen (N) is required by rice in the largest quantities of any nutrient, and it is typically not only the largest fertilizer input cost but the largest input cost for rice producers. Profitable rice grain yields are very dependent on proper and effective N fertilizer management. No other fertilizer nutrient presents a greater challenge to the rice producer than does the effective management of N fertilizer, and no other fertilizer nutrient can provide greater returns in increased rice yield for effective management. (Roberts, Slaton and Norman, 2016) accessed at <https://www.uaex.edu/publications/pdf/mp192/chapter-9.pdf> (University of Arkansas Agricultural Extension Publication).

Clearly the key parameter in these calculations is the boost to yield given by additional fertilizer. Agronomic estimates are not very helpful in estimating an elasticity of rice yield with respect to nitrogen application: the circumstances are so varied. But the elasticity of yield with respect to fertilizer use (1.11) used here, together with an elasticity for increasing fertilizer use as the price falls (0.96) gives the plausible estimate that Haitian fertilizer usage and rice yields increase to levels more in keeping with neighboring countries.

Intervention 3: Crop insurance for rice farmers

Theoretical considerations

Rice farming is vulnerable to all manner of weather, pests and diseases. Prices can fluctuate from year to year as a result of harvest conditions, and natural disasters can disrupt marketing channels. This is particularly true of Haiti, vulnerable as it is to hurricanes and still suffering from the impact of the devastating 2010 earthquake. Farmers largely bear the risks and have to find ways of coping with instability. Can a targeted intervention help farmers by sharing and pooling such risks? Some commentators certainly think so:

“Insurance programs have become an increasingly popular method for providing support to agricultural producers. ... [I]n 2007, more than 100 countries had agricultural insurance programs available. In the United States, multiple-peril crop insurance was available on a limited basis as early as the late 1930s; more recently, insurance has become the dominant safety net program in the United States in terms of government outlays, overshadowing more traditional price and income support programs (Glauber 2015).”

Although developed countries led the way, developing countries have followed the same path. India initiated a crop insurance scheme in 1985 which was made mandatory for farmers taking out loans. A new scheme has been introduced in that country in 2016. China now has a crop insurance program that rivals that of the US in scope.

The theoretical basis for crop insurance is that of pooling the risk faced by one agent (a farmer) with those of other agents. The risk itself can be from price or yield fluctuations. As a result, crop insurance can take the form of single hazard (insuring against a flood, for instance), multiple hazard, or crop revenue coverage.⁹ As with all insurance schemes there is the possibility of moral hazard (farmers who are insured taking less care of the crop) and adverse selection (farmers who are at most risk signing up, leaving out of the pool those who are less likely to have claims). But in general the theoretical benefits can be achieved with a reasonably designed program.

⁹ The US crop insurance program now allows for price-risk coverage. One can of course protect against price risks through the futures markets, a method used by some large agricultural enterprises.

Practical issues

Experience with crop insurance in the US has shown that the key issues are the extent of subsidy needed to encourage farmers to make use of the opportunity to manage risk and the role of the private sector (insurance companies) as providers of the insurance. Since the most vulnerable Haitian farmers are the poorest ones, who can least afford to contribute to insurance schemes, the challenges are inevitably greater than in more developed countries.

Examination of a Crop Insurance Intervention

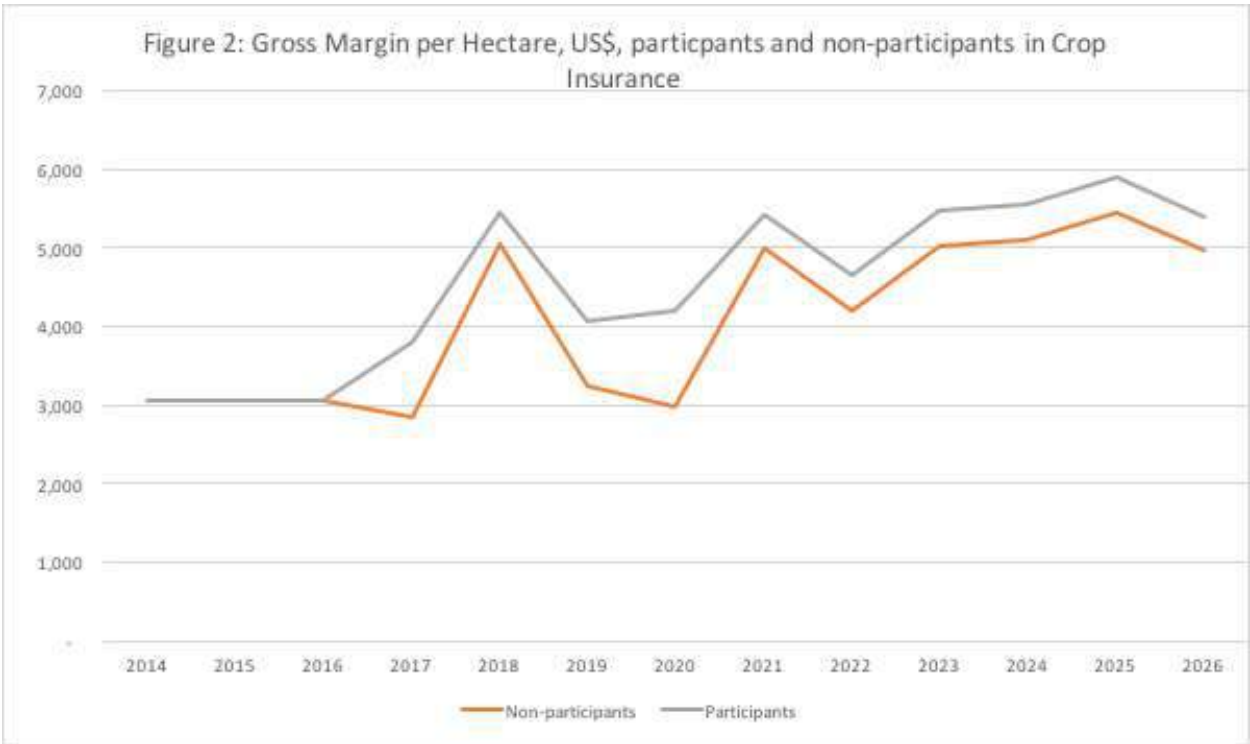
The intervention examined here is a relatively simple yield insurance that compensates farmers for the difference between the yield observed in their region and that agreed as the average for that region. The yield difference is then multiplied by the price to provide a cash payment for the farmer, so providing a steadier, guaranteed income even when harvests are poor. To estimate the impacts of a crop insurance program for rice farmers a number of assumptions are needed. Among these are:

- Participating farmers get a compensating payment if regional yields in a particular year fall below the average for the region
- Yields vary randomly between 40 percent above and 40 percent below average
- The government pays the premium for the crop insurance (or merely pays the subsidy when called for)
- Farmers protected from such extreme yield risks increase their productivity by 10 percent as a result of a more stable income stream
- Sixty percent of the rice farmers sign up for the program

These impacts are shown in Table 5 for one yield scenario. The guarantee of compensation in years of low yields encourages a degree of risk-taking which results in the higher overall yields of rice. The benefits to farmers come in two different forms. First, additional rice produced adds (in the scenario depicted in that table) an extra 8-9 percent to the gross margin for the crop (revenue less variable costs) in years when no insurance payout is triggered. Second, in years when yields are below average, the insurance scheme makes a compensatory payment to the

participating farmers. This results in gross margins that are up to 30 percent higher for participants than those that choose not to participate in the crop insurance scheme. Figure 2 shows the generally higher gross margin over the period of the program.

Figure 2: Gross Margin per Hectare, US\$, participants and non-participants in Crop Insurance



If we compare participating and non-participating farmers in some of the years covered by insurance in the scenario presented in Table 5, we see that the gross margin in year one is estimated as \$3,159 and \$2,259 per hectare for participating and non-participating farmers respectively. The additional income for participating farmers comes both from the yield increase arising from their greater willingness to take risks and the insurance payout as their yield (even with the increase due to risk reduction) is less than the established area yield. In year two, the incomes of both groups recover as yields climb above average area yields, but insured farmers still achieve a 9% higher margin because their greater willingness to take risks. The higher yields are enough to stay above the area average that would trigger insurance payments. The situation is different in year three. In this case, the yield drops to 2.47mt/ha, below the then area average of 2.65mt/ha. The gross margin for non-participants falls to \$2,813/ha. The gross margin is also

somewhat lower for those covered by insurance (\$3,386/ha), but is still 17 percent greater than that of non-participants. Participants receive \$234/ha from the insurance fund..

This is only one yield scenario: it should be emphasized that the distribution of costs and benefits varies with different yield scenarios. In some years farmers do not gain so much from the crop insurance payments but nevertheless maintain the advantage of being willing to take risks.

Calculation of Cost/Benefit ratios

The estimates in the previous section form the basis for the cost benefit analysis. This is shown in Table 6. The costs include 'startup costs,' recurring costs, payments to those who experienced the yield loss, and the premiums paid by farmers themselves. The benefits include the increased production of rice attributed to the reduction of risk and the premiums collected by the government. Total start-up costs for the scheme are \$200,000 in year one, with additional costs of \$100,000 and \$50,000 in the next two years. To this, we have added a recurring cost of \$50,000 to be paid by the government each year. The only other cost to government is payouts to farmers in years when harvests are poor. In the scenario considered, these amount to \$20.0 million in the first year in which compensation is payable. There is also the cost of premiums, which come to \$137,000 in year one, rising slowly according to the assumptions. For this calculation, we assume a share of the cost (\$20 per Ha) to be paid by farmers.

The Benefit Cost Ratios are well above one when there is a payout from the insurance fund (ranging in the scenario shown in Table 6 from 1,38 to 1,52. In other years the benefits are significant (greater rice yields) even though government cost is low. So BCRs of up to 75 are shown in the table. In effect, the existence of government sponsored insurance gives the rice farmers the confidence to push up yields by more intensive farming, including investments in equipment and land improvement as well as greater use of fertilizer.

Policy recommendation

Crop insurance schemes have been widely used in developed countries. However, the cost of running a scheme that indemnifies each farmer against his own risk has been shown to be high, and the consequent private sector premiums would attract little attention from farmers. Subsidizing the premiums appears necessary to have any widespread sign-up. If farmers respond

to the pooling of risk by improving agronomic practices then the benefits can be very significant. Crop insurance is an intervention that generates economic rewards if it is part of a wider approach to assisting farmers to handle year to year risks from variable yields and to recover after extreme weather events.

Conclusions

In this paper we have considered three approaches to improve the productivity of rice farmers in Haiti: Raising the tariff on rice imports; Subsidizing fertilizer to rice farmers; and Introducing crop insurance to manage some of the risk faced by farmers.

The problems associated with the low levels of rice production in Haiti were not caused primarily by the liberalization of trade in the mid-1990s: returns to farmers from this crop have been low for decades. Nevertheless, one superficially attractive option would be to reintroduce import tariffs to protect domestic producers and reinvigorate the farming sector. However, we show that such an intervention is economically unattractive: one has to assume unfeasibly high boosts to yield to achieve a BCR even modestly above unity.

Another problem faced by Haitian farmers is the poor yield relative to other countries in the region and across the world. It is feasible to think that making nitrogen fertilizer available at an affordable price would boost yields significantly and increase farmers' income. Indeed, subsidizing the cost of fertilizer by 50% is shown to boost production and makes economic sense: the BCR is a healthy 3.6 or more. The caveat is that our study shows that, in the absence of programs to build longer-term productivity, the benefit is unsustainable without continued subsidy and considerable effort would be needed to ensure that the fertilizer was used in an agronomically appropriate way.

A third option is to introduce a crop insurance scheme to compensate farmers in years in which their yield falls below the average for the area. This we assume to increase harvests by 10% because of farmers greater willingness to take risks, and provides a steadier income for them in years when the harvest is poor. Under these conditions the benefits of the intervention exceeds the costs.

In summary, we can recommend a program to subsidize nitrogen fertilizer, but past experience has shown that this requires great care over the administration of the program, including the monitoring not only of the distribution of the subsidy but also of the use to which the fertilizer would be put by the rice farmers of Haiti. A crop insurance policy would be a valuable addition to the programs aimed at increasing rice yields on the assumption that farmers are risk-averse and would adopt improved farming practices in the presence of a risk-pooling scheme. Under these conditions benefits could be significant as compared to costs. But as with many such interventions the benefits depend on transparency and sound program administration.

Summary table

Interventions	Discount	Benefit (millions of dollars)	Cost	BCR	Quality of Evidence
Rice tariff	3%	\$182.5	\$216.5	0.84	Medium (supply response and consumer demand fairly well established)
	5%	\$170.5	\$202.5	0.84	
	12%	\$135.4	\$161.2	0.84	
Fertilizer subsidy	3%	\$943.5	\$251.6	3.8	Limited (Agronomic evidence on yield response not adequate for more accurate assessment)
	5%	\$883.9	\$235.9	3.7	
	12%	\$708.1	\$189.8	3.7	
Crop insurance	3%	\$189.8	\$97.6	1.95	Limited (reaction of farmers to more stable returns not well known)
	5%	\$175.1	\$90.3	1.94	
	12%	\$132.4	\$68.6	1.93	

Note: Costs and benefits generally move together over the period, making the discount factor not particularly crucial.

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Tables

Table 1: Impacts of a 20 percent tariff on rice imports

		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
	unit				1	2	3	4	5	6	7	8	9	10
Output of rice	000 KGS	80,000	75,000	80,000	88,880	89,769	90,666	91,573	92,489	93,414	92,204	90,960	89,682	88,370
Consumption of rice	000 KGS	500,000	480,000	500,000	484,500	494,190	504,074	514,155	524,438	534,927	552,805	571,184	590,077	609,497
Imports of rice	000 KGS	420,000	405,000	420,000	395,620	404,421	413,407	422,582	431,949	441,513	460,601	480,224	500,395	521,127
Tariff	%	0%	0%	0%	20%	20%	20%	20%	20%	20%	15%	10%	5%	1%
Government revenue	US\$000	-	-	-	114,200	119,075	124,155	129,449	134,965	140,712	112,299	79,616	42,310	8,989
Price of Rice at border	US\$/000KGs	1,415	1,415	1,415	1,443	1,472	1,502	1,532	1,562	1,594	1,625	1,658	1,691	1,725
Import costs	US\$000	594,300	573,075	594,300	570,998	595,375	620,776	647,244	674,824	703,560	748,657	796,162	846,196	898,881
Consumer price	US\$/000KGs	1,698	1,698	1,698	2,078	2,120	2,162	2,206	2,250	2,295	2,243	2,188	2,131	2,070
Consumer costs	US\$000	849,000	815,040	849,000	1,006,962	1,047,643	1,089,968	1,134,002	1,179,816	1,227,481	1,239,963	1,249,993	1,257,295	1,261,569
Producer Price	US\$/000KGs	1,203	1,203	1,203	1,472	1,502	1,532	1,562	1,594	1,625	1,589	1,550	1,509	1,466
Producer revenue	US\$000	96,220	90,206	96,220	130,846	134,798	138,869	143,062	147,383	151,834	146,495	141,000	135,354	129,563
Counter-factual														
Output of rice	000 KGS	80,000	75,000	80,000	80,800	81,608	82,424	83,248	84,081	84,922	85,771	86,629	87,495	88,370
Consumption of rice	000 KGS	500,000	480,000	500,000	510,000	520,200	530,604	541,216	552,040	563,081	574,343	585,830	597,546	609,497
Imports of rice	000 KGS	420,000	405,000	420,000	429,200	438,592	448,180	457,968	467,960	478,160	488,572	499,201	510,051	521,127
Tariff	%	-	-	-	-	-	-	-	-	-	-	-	-	-
Government revenue	US\$000	-	-	-	-	-	-	-	-	-	-	-	-	-
Price of Rice at border	US\$/000KGs	1,415	1,415	1,415	1,443	1,472	1,502	1,532	1,562	1,594	1,625	1,658	1,691	1,725
Import costs	US\$000	594,300	573,075	594,300	619,464	645,680	672,991	701,442	731,081	761,957	794,120	827,625	862,526	898,881
Consumer price	US\$/000KGs	1,698	1,698	1,698	1,732	1,767	1,802	1,838	1,875	1,912	1,950	1,989	2,029	2,070
Consumer costs	US\$000	849,000	815,040	849,000	883,300	918,985	956,112	994,739	1,034,926	1,076,737	1,120,237	1,165,495	1,212,581	1,261,569
Producer Price	US\$/000KGs	1,203	1,203	1,203	1,227	1,251	1,276	1,302	1,328	1,354	1,382	1,409	1,437	1,466
Producer revenue	US\$000	96,220	90,206	96,220	99,126	102,119	105,203	108,381	111,654	115,026	118,499	122,078	125,765	129,563

Table 2(a) Costs and Benefits from a 20 percent rice tariff

<i>Costs and Benefits</i>		1	2	3	4	5	6	7	8	9
Loss of Consumer surplus	US\$000	143,536	149,335	155,368	161,645	168,176	174,970	137,404	95,911	50,208
Gain in Producer Surplus	US\$000	24,490	25,230	25,991	26,776	27,585	28,418	21,696	14,721	7,490
Benefit Cost Ratio		0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15
Tariff revenue returned to consumers	US\$000	114,200	119,075	124,155	129,449	134,965	140,712	112,299	79,616	42,310
Net cost to Consumers	US\$000	29,337	30,260	31,213	32,196	33,211	34,258	25,106	16,294	7,899
BCR With subsidy to consumers		0.83	0.83	0.83	0.83	0.83	0.83	0.86	0.90	0.95

Table 2(b) Costs and Benefits from a 20 percent rice tariff assuming increase in yield from greater certainty

<i>Costs and Benefits</i>		1	2	3	4	5	6	7	8	9
Loss of Consumer surplus	US\$000	143,536	149,335	155,368	161,645	168,176	174,970	137,404	95,911	50,208
Gain in Producer Surplus	US\$000	34,048	35,077	36,136	37,227	38,352	39,510	29,393	19,427	9,627
Benefit Cost Ratio		0.24	0.23	0.23	0.23	0.23	0.23	0.21	0.20	0.19
Tariff revenue returned to consumers	US\$000	109,068	113,789	118,709	123,839	129,185	134,758	108,927	78,108	41,931
Net cost to Consumers	US\$000	34,468	35,546	36,659	37,806	38,991	40,212	28,478	17,802	8,278
BCR With subsidy to consumers		0.99	0.99	0.99	0.98	0.98	0.98	1.03	1.09	1.16

Table 3: Estimated Impacts of a Subsidy on Fertilizer

Table 3: Estimated Impacts of a Subsidy on Fertilizer														
	unit	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Intervention year					1	2	3	4	5	6	7	8	9	10
percent of fertilizer cost refunded		0%	0%	0%	50%	50%	50%	50%	50%	40%	30%	20%	10%	0%
Fertilizer use	thousand Kg	750	750	750	769	788	808	828	849	870	892	914	937	960
Fertilizer price	US\$/000KG	48.00	48.00	48.00	48.48	48.96	49.45	49.95	50.45	50.95	51.46	51.98	52.50	53.02
Subsidy per KG	US\$/000KG	0.0	0.0	0.0	24.2	24.5	24.7	25.0	25.2	20.4	15.4	10.4	5.2	0.0
Fertilizer use with subsidy	thousand Kg	750	750	750	1,132	1,155	1,179	1,202	1,227	1,175	1,123	1,070	1,015	960
gross farm expenditure on fertilizer	US\$000	36,000	36,000	36,000	37,269	38,583	39,943	41,351	42,808	44,317	45,880	47,497	49,171	50,904
farm expenditure on fertilizer net of subsidy	US\$000	36,000	36,000	36,000	18,635	19,291	19,971	20,675	21,404	26,590	32,116	37,997	44,254	50,904
Yield	000Kg/ ha	2.54	2.54	2.54	2.57	2.61	2.65	2.69	2.73	2.77	2.82	2.86	2.90	2.94
Yield with fertilizer	000Kg/ ha	2.54	2.54	2.54	3.94	3.99	4.04	4.10	4.15	3.92	3.68	3.44	3.20	2.94
total area in rice	Thousand ha	56.6	56.6	56.6	57.2	57.8	58.3	58.9	59.5	60.1	60.7	61.3	61.9	62.6
Rice Price	US\$/000kg	1415	1415	1415	1,443	1,472	1,502	1,532	1,562	1,594	1,625	1,658	1,691	1,725
Rice output without subsidy	thousand Kg	144	144	144	147	151	155	159	163	167	171	175	180	184
Rice output with subsidy	thousand Kg	144	144	144	225	231	236	241	247	236	224	211	198	184
Farm receipts without subsidy	US\$000	203,265	203,265	203,265	212,545	222,248	232,394	243,004	254,098	265,698	277,828	290,512	303,774	317,642
Farm receipts with subsidy	US\$000	203,265	203,265	203,265	325,106	339,368	354,258	369,803	386,032	375,521	363,531	349,961	334,703	317,642
Receipts net of Fert cost	US\$000	167,265	167,265	167,265	175,276	183,665	192,451	201,653	211,289	221,381	231,948	243,015	254,603	266,738
Receipts net of Fert cost (with subsidy)	US\$000	167,265	167,265	167,265	306,471	320,076	334,286	349,127	364,628	348,930	331,415	311,964	290,449	266,738
Government payments on subsidy	US\$000	-	-	-	18,635	19,291	19,971	20,675	21,404	17,727	13,764	9,499	4,917	-
Increase in farm receipts	US\$000	-	-	-	112,561	117,120	121,863	126,799	131,935	109,823	85,703	59,449	30,929	-
Increase in rice output value	US\$000	0	0	0	112,561	117,120	121,863	126,799	131,935	109,823	85,703	59,449	30,929	0
fertilizer use per ha	Kg	13.24	13.24	13.24	13.44	13.64	13.84	14.05	14.26	14.47	14.68	14.90	15.12	15.35
Fertilizer use per ha with subsidy	Kg	13.24	13.24	13.24	19.80	20.00	20.20	20.41	20.61	19.55	18.50	17.44	16.39	15.35

Table 4: Costs and Benefits of a Fertilizer Subsidy

Table 4: Costs and Benefits of a Fertilizer Subsidy										
		2017	2018	2019	2020	2021	2022	2023	2024	2025
year of intervention		1	2	3	4	5	6	7	8	9
Costs										
Cost of the subsidy		27,448	28,282	29,143	30,031	30,948	23,958	17,339	11,120	5,330
Cost of the extra fertilizer		8,814	8,991	9,172	9,356	9,544	9,346	8,342	6,484	3,720
Total Cost		36,262	37,273	38,314	39,387	40,492	33,304	25,682	17,604	9,051
Benefit										
Extra rice		112,561	117,120	121,863	126,799	131,935	109,823	85,703	59,449	30,929
Fertilizer Cost Reduction		18,635	19,291	19,971	20,675	21,404	17,727	13,764	9,499	4,917
Total Benefit		131,195	136,411	141,835	147,474	153,339	127,550	99,467	68,949	35,846
Benefit Cost Ratio		3.6	3.7	3.7	3.7	3.8	3.8	3.9	3.9	4.0

Table 5: Impact of crop insurance program for rice farmers

Table 5: Impact of crop insurance program for rice farmers														
crop year		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Program year					1	2	3	4	5	6	7	8	9	10
Non-participating farmers														
current yield	mt/ha	2.54	2.54	2.54	1.84	2.75	2.20	3.00	2.89	3.62	1.79	3.45	2.58	2.04
price	\$/mt	1,203	1,203	1,203	1,227	1,251	1,276	1,302	1,328	1,354	1,382	1,409	1,437	1,466
Gross margin per ha	\$/ha	3,051	3,051	3,051	2,259	3,445	2,813	3,906	3,840	4,902	2,478	4,860	3,709	2,991
Participating farmers														
Average yield	mt/ha	2.54	2.54	2.54	2.57	2.61	2.65	2.69	2.73	2.77	2.82	2.86	2.90	2.94
Risk reduction yield increase	mt/ha	0.00	0.00	0.00	0.257	0.261	0.265	0.269	0.273	0.277	0.282	0.286	0.29	0.29
Current yield for participants	mt/ha	2.54	2.54	2.54	2.10	3.01	2.47	3.27	3.17	3.90	2.07	3.73	2.87	2.33
Payment from insurance	US\$/ha				583	-	234	-	-	-	1,023	-	43	893
Gross margin per ha	US\$/ha	3,051	3,051	3,051	3,159	3,772	3,386	4,257	4,203	5,278	3,889	5,263	4,169	4,316
Comparison														
Comparison		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Gross margin per ha non-participants	\$/ha	3,051	3,051	3,051	2,259	3,445	2,813	3,906	3,840	4,902	2,478	4,860	3,709	2,991
Gross margin per ha participants	\$/ha	3,051	3,051	3,051	3,159	3,772	3,386	4,257	4,203	5,278	3,889	5,263	4,169	4,316

Table 6: Costs and Benefits of a Crop Subsidy

Table 6: Costs and Benefits of a Crop Subsidy											
Costs		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
start-up costs paid by govt	000\$	200	100	50	0	0	0	0	0	0	0
recuring costs paid by govt	000\$	50	50	50	50	50	50	50	50	50	50
cost of payouts paid by govt	000\$	20,020	-	8,176	-	-	-	37,257	-	1,585	33,530
Cost of premium paid by farmer	000\$	137	139	140	141	143	144	146	147	149	150
Total Costs	000\$	20,407	289	8,416	191	193	194	37,453	197	1,784	33,730
Benefits											
increased productivity	000\$	10,840	11,335	11,852	12,393	12,959	13,551	14,169	14,816	15,492	16,200
payouts received by farmer	000\$	20,020	-	8,176	-	-	-	37,257	-	1,585	33,530
Premium received by govt	000\$	137	139	140	141	143	144	146	147	149	150
Total Benefits	000\$	30,997	11,473	20,168	12,535	13,102	13,695	51,572	14,963	17,226	49,880
Benefits/costs		1.52	39.75	2.40	65.48	67.94	70.49	1.38	75.89	9.66	1.48

For modernised professional education in
Haiti Notes on three proposed
interventions for the rice market in Haiti

Haiti Priorise

Wesny Chaperon

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Summary of Proposals

With the stated aim of developing agriculture in general, and rice production in particular, the following three policy measures were put forward for consideration:

- a) increasing rice import tariffs,
- b) subsidizing fertilizers and
- c) insuring crops.

Questions Regarding the Proposed Measures

1) Are the proposed measures sensible and realistic given the level of economic development in Haiti?

The author has supported each of his proposed measures with empirical and theoretical arguments as well as a cost benefit analysis. Let's take a closer look at each proposed measure to ascertain if it is sensible and realistic given the level of economic development of the country.

a) Proposed Policy Measure 1: Increasing Rice Import Tariffs

The measure proposed here is to increase the rice import tariff from 5% to 20% over a ten-year period (2017-2026). This tariff would be reduced during the seventh year and would then be stopped in the tenth year. The author, after having conducted a cost benefits analysis and deducted a very low cost benefit ratio of 0.16, concluded that the cost of this measure would be relatively high compared to the benefits. Based on this, he stated that this proposed measure is economically doubtful.

Considering the current economic climate of Haiti, touched upon by the author, putting in place such a measure would not be realistic. In fact, since May 2015, the Haitian economy has been hit with rising inflation and growing exchange rates. In a January 2016 monthly report, the Banque de la République d'Haiti (BRH, the central bank), noted the following:

"In January 2016, the rate of inflation, measured in terms of the consumer price index (CPI), stood at 13.3% year on year. Having increased by 80 basis points compared to December 2015, annual inflation has continued in its upward trajectory that began in May 2015. Between May 2015 and January 2016, the inflation rate has doubled. If looked at on a monthly basis, inflation has grown at the same 1.1% rate as the previous month.

The total monthly inflation rate for the first four months of fiscal year 2015-2016 has reached 3.9%, compared to 2.2% for the same period of the previous fiscal year.”

Regarding the local currency depreciation, the bank noted the following:

“During the month of January 2016, the local currency depreciation against the U.S. dollar continued. In fact, the exchange rate went from 56.6970 gourdes to the dollar in December 2015 to 59.4546 Gourdes to the dollar in January 2016, which translates to a 5% depreciation in January 2016 compared to the previous month.”

And as the central bank currently forecasts that these rates will continue to rise for the remainder of 2016 and 2017, it’s hard to imagine implementing a policy that seeks to raise rice import tariffs by 20% and that would cause rice prices to soar on the local market.

If we look at the cycles of Haiti’s real and cash economy, it is clear that this plan cannot be implemented in the next five years. Nevertheless, this proposed protective measure merits further consideration – finding a way to gradually increase the rice import tariff would help to protect Haitian farmers, increase local production, and reach compliance with the common external tariff applied by the CARICOM (of which Haiti is a member) without penalizing consumers too much.

b) Proposed Policy Measure 2: Subsidizing Fertilizers

This plan proposes a fertilizer subsidy of 50% of the market price for five years, which would then be reduced to a 10% subsidy and eventually be eliminated by the tenth year. A cost benefits analysis of this proposed policy measure gives an attractive cost benefits ratio of 3.6, which increases to 4 at the end of the subsidy period. This allows us to conclude that this approach would be very beneficial to boosting rice production in Haiti. However, the author also noted that once the subsidy ends, the benefits also end – the positive impact of this approach is not sustainable.

Evidently, given the current context, this approach seems more sensible and realistic than the first one. However it is not likely that the Haitian government will provide a subsidy of 50% of the market price for fertilizers as outlined in the first five years of the plan. In fact, the government’s financial resources have been quite stagnant over the last three years. The budget for fiscal year 2014-2015 was initially set at 122.6 billion gourdes, but was then reduced to 109.7 billion in March 2015. For fiscal year 2015 – 2016 it was again 122.6 billion gourdes.

Furthermore, for fiscal year 2016-2017, the total budget is estimated to be 121.9 billion gourdes. This is partly due to the steady reduction of foreign aid in general and a

substantial reduction of financing through the PetroCaribe oil alliance. Given the position that it is in, is it not doubtful that that Haitian government will be able to provide a 50% subsidy of fertilizers for rice production?

c) Proposed Policy Measure 3: Crop Insurance for Rice Farmers

This third approach proposes to implement an insurance program for rice farmers, based on yield per region. If the yield obtained for a region is less than the set average yield for that region, the difference found will be multiplied by a price and given to the farmer. This will ensure that he receives a stable income and that he is protected against bad crops.

The cost benefit analysis of this measure reveals a cost benefit ratio of close to 1 and shows that the recurrent cost of this plan surpasses the extra rice produced. This enables the author to conclude that this insurance program is not economically effective.

Considering the high risks for farmers due to the deterioration of the environment, the measure would require a significant contribution from the Haitian government to cover bad crops. For many of the same reasons noted above, this is highly unlikely. It is even less likely that the private sector would insure farmers.

Partial conclusion

It's been shown that, of the three policy measures proposed to develop local rice production and improve the quality of life of Haitian farmers, the most sensible would be the subsidization of nitrogen fertilizers, but at less than 50% of the market price for the first few years. It may also be beneficial to further study the possibility of increasing rice import tariffs to a level that is still economically viable.

2) Are there costs and benefits that have been omitted, underestimated or overestimated? The logical costs and benefits of each option have been taken into account and assessed carefully by the author. However, sources for the data used as well as the bases of calculation have not been disclosed.

3) Is the policy measure proposed relevant to the problem at hand?

The three proposed measures are considered relevant to the crucial problem of revitalizing local production of rice, reducing rice imports and supporting farmers' wellbeing. Indeed, in the agricultural development policy of the Haitian Ministry of

Agriculture, Natural Resources and Rural Development (MARDNR) for the 2010-2025¹ period, the following were identified as obstacles to the development of the agricultural sector:

- a) Excessive liberalization of the agricultural products market (low tariffs, elimination of quantitative restrictions),
- b) Limited access to agricultural inputs and equipment due to low investment in agriculture
- c) The recurrence of natural disasters, linked to the high level of vulnerability of certain regions of the country,
- d) Losses after high yields.

The three proposed measures provide possible solutions to these problems. However, the many other constraints that the agricultural sector in general and rice growing in particular face, may compromise the expected impact of implementing these policies. For example, the rapid deterioration of natural resources (soil, water, forests) and more importantly the gradual reduction in the land's capacity to produce, the mismanagement of infrastructure and irrigation water, and the lack of epidemiological control are, amongst others important factors that need to be taken into account in any public policy to develop agriculture.

4) What will be the implications for current public policy?

Implementation of the proposed policies would have many implications for current public policies. The proposal to increase import tariffs on rice would require a revision of the following: the current fiscal policy, liberalization and free trade agreements signed by the Haitian government (Enhanced Structural Adjustment Facility (ESAF) signed with the IMF and World Bank, *Economic Partnership Agreements (EPA)*, etc.), legislation on the current import tariffs, agricultural policy and/or any other bilateral agreement related to rice importation. The second proposal, to subsidize fertilizers, would lead to corrections to the national budget and a reallocation of certain investment funds. The third proposal would require a legal framework on agricultural insurance systems and the creation of an agency to manage it.

¹ MARNDR, Agricultural Policy Development, p, 15 (March 2011)

5) Are there other consequences to intervening that were not mentioned by the author?

Moving forward with the proposals made by the author would bring many benefits for rice farming and for the national economy as a whole. But it would also have many important consequences. The author mentions many of these consequences. Nonetheless, there are other important consequences that were not acknowledged by the author.

For example, the first proposal would worsen current inflation, already at about 14%, and cause serious consequences socially and politically, as well as for bilateral and multilateral relations.

In terms of the second proposal, the main consequence is also the main hindrance to its implementation: a lean government budget. As mentioned before, financing up to 50% of the market price for fertilizers in an economic climate marked by a reduction in international aid and financial support from PetroCaribe, seems hard to imagine.

This is also relevant in regards to the third proposal. Considering the deterioration of the environment, the risks would discourage private sector investment and the government would need to bear the costs of launching this initiative.

FERTILIZER SUBSIDIES IN HAITI

Haiti Priorise

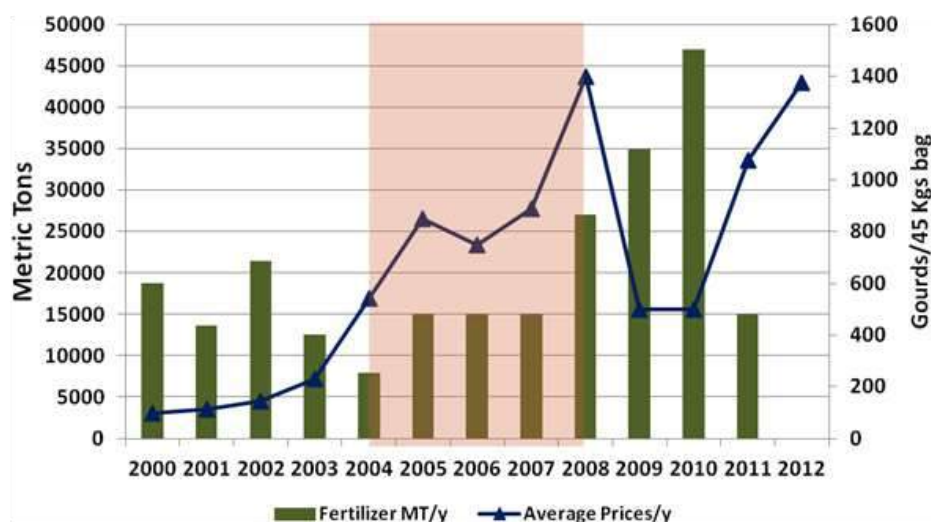
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CONTEXT OF FERTILIZER SUBSIDIES IN HAITI:

Supply-side subsidy program:

Since 2000 in Haiti fertilizers have been subsidized for import within the framework of the Fertilizer Subsidy Program (PSF). What we were seeing, then, was a system of "supply-side subsidy." Despite these subsidies of up to 50% of the real and market value of fertilizers, the annual quantities used averaged 20,000MT (except for the years 2009 and 2010 when the combination of several donations made the quantities imported higher: 35,000 and 45,000MT). As shown in the table below, subsidizing the supply did not help the development of fertilizer use in Haiti during this period.

Graph 1 – Total Fertilizer Imports & Consumption in MT and Average Prices/45 kg bags



Source: Various, Ballande & Damais, 2004, Seed Security Assessment 2010, and WINNER Program

Main causes of the failure of the supply-side subsidy:

The first issue highlighted by the audit of the Ministry of Finance and the Treasury is cronyism governing the distribution of subsidized fertilizers, and the second is the generalization of the misappropriation related to this distribution. The third cause was the lack of private sector development induced by the supply-side subsidy. Indeed, the effects of this strategy were numerous and very damaging to the private sector, such as:

- The unpredictable and irregular side of a supply that depends on the availabilities of the major donors (Venezuela; Japan with the KR2, to cite the most important ones), preventing the import of fertilizer at the real market price by the private sector, lest their stock be unsaleable.

- No possibility of developing the private sector distribution network, since it is the state that "distributes" the subsidized fertilizers
- The demand from farmers, based on political demand and not on agronomic needs and income increase (this is the case in particular of Artibonite)
- The fact that even when the PSF is not active, the private sector does not dare to import at the market price for fear of a supply-side subsidy decided at the last moment.
- The focus of the private sector, concentrated on the "big deals" of imports on behalf of the government in the context of the supply-side subsidy, not allowing the development of the distribution network

Following these findings and the audit of the public treasury, the effective shutdown of the PSF was pronounced on 12/31/2016.

Implementation of a pilot project to subsidize demand in Haiti:

In parallel since 2012, the Ministry of Agriculture, Natural Resources and Rural Development (MARNDR), with the financial support of several partners (IDB, World Bank, AFD), initiated the implementation of demand-side subsidy pilot projects (SMART subsidies) because they allow precise targeting of the beneficiaries of such support, and offer farmers not only technical packages at a subsidized rate, but also support in terms of agricultural consulting services provided by input suppliers. This mechanism of stimulating demand through a system of vouchers must also allow the suppliers of inputs and agricultural advice to develop on a commercial basis.

These projects include RESEPAG1, co-financed by the World Bank and the first to inaugurate this integrated approach to agricultural advice and facilitation of access to inputs. The Natural Disaster Mitigation Program (PMDN), financed by the IDB; the Food Security Project (SECAL), co-financed by the EU and AFD; and the Technology Transfer Program for Farmers - PTTA are currently under way under the aegis of the MARNDR, and the RESEPAG project is entering a second phase. The AVANSE project (USAID) is being implemented in partnership with MARNDR, according to somewhat different modalities emphasizing the development of the existing private sector and increasing farmers' incomes and financial participation by the latter for partially subsidized inputs via the electronic voucher system.

The Voucher Incentive System (SIBA): the AVANSE/USAID Experience

The "Appui à la Valorisation du Potentiel Agricole du Nord, à la Sécurité Economique et Environnementale" (AVANSE) program financed by USAID and implemented in partnership with MARNDR is a five-year program designed to develop lasting, sustainable and significant economic

growth in an area with high agricultural production potential composed of the North and North-East of the Republic of Haiti. To this end, AVANSE promotes the introduction of improved technical packages for agriculture in the plains as well as in the foothills and mountain areas, focusing on three key crops: rice, bananas/plantains and cocoa. During the program period, AVANSE aims to work with 20,000 farm households using the Champs Ecole Paysans (CEP) approach, which will be the focal point for the dissemination of good farming practices to their peers.

By introducing the Voucher Incentive System (SIBA), which is a support program for small farmers, AVANSE seeks, as much as possible, to replace direct subsidies for the introduction of new techniques with a more market oriented voucher system. This system was designed to stimulate the market demand by partially subsidizing producers' demand, while strengthening the capacity of providers to deliver the key inputs of technical packages disseminated by AVANSE.

Since February 2014, AVANSE has tested and validated the functioning of the SIBA and launched, in March 2015, a system of electronically read and computer processed vouchers developed by a specialized Haitian company, TRANSVERSAL, allowing a recording of the commercial transactions of the actors in real-time on a 24/7 online, searchable platform that allows efficient traceability of the system. Through this system, AVANSE has offered subsidies to more than 5,000 rice farmers for the purchase of fertilizers promoted by the project to accelerate their adoption, in order to improve the farmers' productivity in the North and Northeast of Haiti (Ouanaminthe, Ferrier, Fort-Liberté and Grison-Garde).

Before entering further into the explanation of how this incentive system works, it is important to understand what a SIBA is.

What is a Voucher Incentive System (SIBA)?

Incentive systems are a set of means (e.g. demonstrations + subsidies) implemented to bring about rapid changes in behavior (e.g. change of cultivation methods + purchase of fertilizer) in a section of the population, by ensuring that the immediate interest of incentives (economic access to benefits that have hitherto been too costly) triggers a process of long-term change that will then be self-sustaining through the well-being it brings to the person (improvement of household standard of living) who had access to the incentive.

Graph 2 below shows that to ensure the **subsidy exit strategy**, it is imperative that the producer

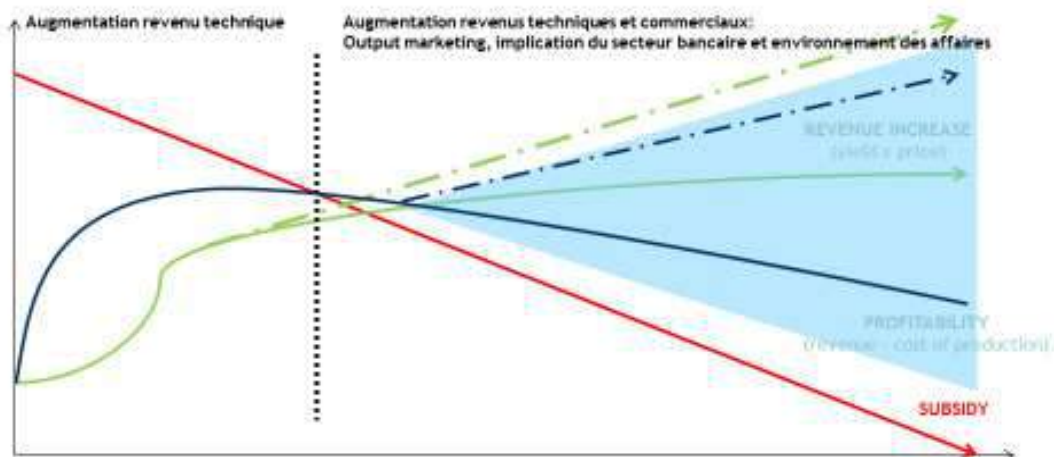
Box 1 – Some principles of implementation:

To arrive at the objectives described above, incentive systems must therefore be:

- 1) Very attractive, especially at the beginning, in order to bring about rapid changes in technical behavior;
- 2) Geared towards profitable activities to ensure the sustainability of the changes;
- 3) Defined in time with an exit strategy designed and known from the implementation of the program in order to ensure the profitability of the changes even and especially after the end of the incentives;
- 4) Free from distorting effects on the market, both for the input market, by ensuring that the distribution chain remains in the economic reality of its activities, and for the agricultural production market, by ensuring that the increase in production induced by the incentives will not lead to a decrease in profitability at the farmer's level;
- 5) "Commercial," by integrating all the activity upstream and downstream of the incentive (input and marketing suppliers) and ensuring the gain in profitability of all the actors participating in the system.

sees not only an increase in output, but also an increase in income through the adoption of improved production technology, allowing him to finance a larger portion of the subsidized inputs over time until he assumes total responsibility after the end of the project. In addition to the increase in yield obtained through the adoption of the new technology, the valorization of production by creating links with higher value-added buyers is encouraged in order to sustain this increase in income over time.

Graph 2 – Subsidy Exit Strategy



To facilitate the implementation of efficient, transparent, traceable and sustainable incentive systems, the use of vouchers is strongly recommended, even indispensable. The latter are a means of payment in whole or in part (non-falsifiable fiduciary paper of a certain face value) for identified use (e.g. fertilizer purchase) intended for a predetermined population group (e.g. farmers who are able to pay cash for the non-subsidized portion and who are cultivating rice) redeemable for benefits from a network of system affiliates (e.g. input distributors) for a defined period of validity,

which must at the time of issuance have their counterpart in available value in a dedicated account, placed in a first-tier bank, for the duration of their validity.

How does it work?

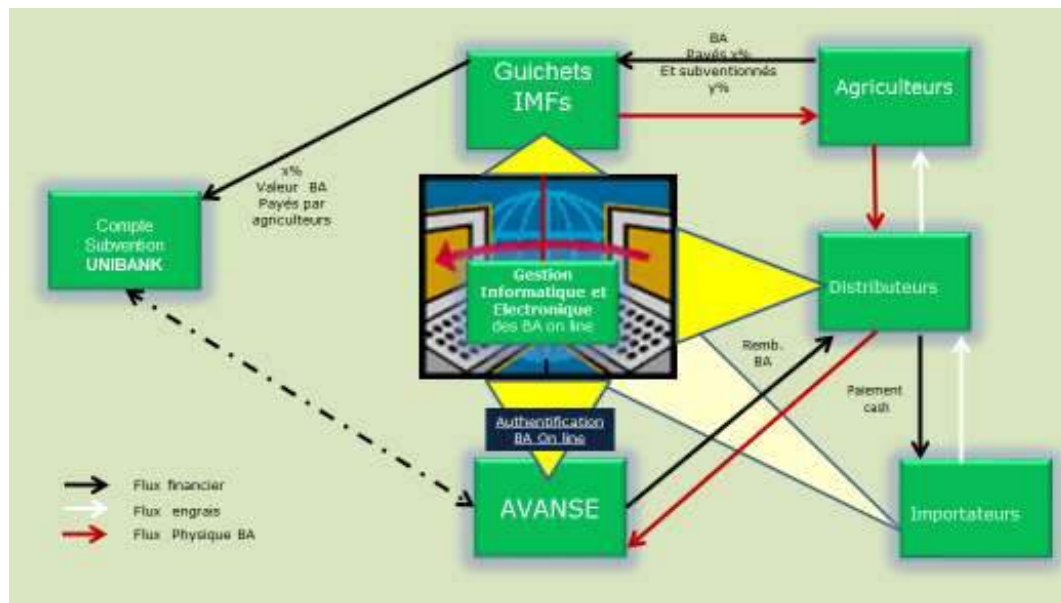
As part of the AVANSE project, the Champs Ecole Paysans (CEP) was the basis for the implementation of the system. In effect, the advantage of CEPs is that farmers who grow crops receive training and technical follow-up for the implementation of cultivation methods and inputs, thereby putting the odds on their side for the optimization of inputs and, therefore, a significant increase in the profitability of crops, which is one of the essential conditions for the proper functioning of a SIBA.

Once the eligible producers have been identified by the network and integrated into the system's database, the process of buying fertilizers through the use of vouchers is carried out in three consecutive steps with partners affiliated with the system, namely the **financial institutions** (MFIs) responsible for collecting the payment of the non-subsidized part from the producer and the activation of the vouchers, the **input distributors** responsible for delivering fertilizers against receipt of vouchers, and the **importer** responsible for establishing a stock of fertilizer in advance for the season from which the distributors are supplied (see Operation of the SIBA diagram below) - these affiliated actors are all equipped with smartphones capable of "reading" the vouchers, allowing them to be traced in the different phases of their circuit:

- 1) *Purchase of the voucher by the farmer at the MFI counter (voucher activation)*: the producer enters his identity number into the smartphone (NIC/TIN) in order to validate his identity with the teller; the voucher is scanned by the teller when it is purchased by the farmer; the sum received is recorded in the database. The teller has the producer sign a record of deposit and provides him with a copy; the teller will retain in his archives the original of the record, which will be available in the event of an audit. A picture is taken on a smartphone of the receipt provided by the MFI during the validation of the transaction. A picture is also taken of the producer's identification card (NIC/TIN). These pictures are then directly stored in the database and can be consulted online;
- 2) *Purchase of an input stock from an importer affiliated with the SIBA*: before the launch of the campaign, Distributors source from an Importer affiliated with the SIBA; the latter delivers the inputs to the Distributor at its request and enters the product type and the quantity delivered at the time of the delivery into the Distributor's smartphone; distributors' stocks can, therefore, be monitored remotely to avoid supply problems during a campaign;

- 3) *Purchase of inputs by producers with their vouchers from input distributors (voucher negotiation):* the farmer then goes with his voucher to the affiliate Distributor closest to his home. The distributor also has an identified smartphone allowing him to scan the voucher in order to give the corresponding inputs to the farmer; the transaction is instantly saved to the database. Here too, the farmer identifies himself by entering his identification number (NIC/TIN), signs a delivery note, which is, along with his identity card, then photographed with the distributor's smartphone; these items are then instantly entered into the database and can be consulted online by AVANSE.

Diagram 1 – Operation of the SIBA



Computer and electronic management of vouchers has the advantage of tracing all vouchers in real time, continuously monitoring the evolution of input inventories from different distributors in real time and, thereby, triggering replenishments via importers in due course. It also have the advantage of producing all signed receipts in electronic form directly available online for AVANSE and of authenticating the vouchers to be reimbursed to the distributors before proceeding to this. It is, therefore, a control and a continuous monitoring and a production of the accounting vouchers required for electronic reimbursement, which can be printed when necessary.

Advantages of systems subsidizing demand:

The main advantages of this type of system are the following:

- **The subsidy is in the hands of the farmer**, because he is the one who receives the vouchers. As a result, misappropriation of the subsidy becomes virtually impossible;

- **The producer is considered to be an entrepreneur, not a helpless person**, by investing part of his income in the payment of the non-subsidized portion of the vouchers, thus encouraging him to maximize effective use;
- **The private sector can grow given that the market price is respected**; with the vouchers, the distribution network sells at the market price, the subsidy being reimbursed directly to the distributor. There is, therefore, no distortion, unlike import subsidies that make unsubsidized imports impossible at a higher price than the subsidized imports and, therefore, a non-competitive selling price compared to the selling price based on subsidized imports;
- **Traceability of funds** is ensured thanks to the computer and electronic management system, allowing one to follow the progress of the voucher from the farmer to the dealer/retailer, via the importer and the financial institution, insofar as all these stakeholders have been affiliated beforehand with the SIBA;

Thus, voucher incentive systems are a tool allowing traceable transmission of a partial and regressive subsidy over time to a targeted population in order to achieve a specific goal.

Results

As part of AVANSE, the implementation of this system contributed to the achievement of the following results:

- Doubling of producer yields through adoption of the technical package promoted by AVANSE, including the use of fertilizers (i.e. Rice Intensification System - SRI);
- Improved access to fertilizer for more than 5,000 rice producers (including some producers renewed from one season to the next);
- Reinforcement of the inputs and services distribution network by mobilizing five distributors in the project's intervention zones (Ouanaminthe, Ferrier, Fort-Liberté and Grison Garde) and an importer, ensuring the establishment of a stock in advance for each season;
- Reduction of the subsidy level from 75% to 50% from 2014 to 2016 with the objective of reducing it to zero by 2018 (end of project);
- Mobilization of ten savings banks and credit unions that have developed links between producers and financial services.

Conclusion

Thus, two observations can be made on the situation of the various fertilizer subsidies in Haiti:

- The state subsidy on "importing" fertilizers created a market distortion which prevented importers from importing more at the normal price, thereby limiting the overall use of fertilizers in Haiti, and entered into contradiction with the vouchers, which respect the real price of inputs, thus not limiting import and distribution to subsidized inputs only. If this situation changes with the effective termination of the PSF on 09/30/2016, there is nonetheless no clear decision by MARNDR on the future of fertilizer subsidies and its mode of administration in Haiti;
- Several projects implementing incentive schemes (demand-side subsidy), some of which operate in similar intervention areas, coexist with different strategies, which can lead to confusion among farmers who are targeted by several different projects;

In this context, it is important that all actors, MARNDR and financial backers, continue to work together, as has already been initiated within the framework of the dialogue between the different projects and MARNDR, to reach a consensus on the type of input subsidy to implement in Haiti at the national level and, in the event that the demand subsidy is the selected method, a harmonization of the incentive systems in Haiti in order to improve their effectiveness and scope for the benefit of Haitian producers.

Haiti faces some of the most acute social and economic development challenges in the world. Despite an influx of aid in the aftermath of the 2010 earthquake, growth and progress continue to be minimal, at best. With so many actors and the wide breadth of challenges from food security and clean water access to health, education, environmental degradation, and infrastructure, what should the top priorities be for policy makers, international donors, NGOs and businesses? With limited resources and time, it is crucial that focus is informed by what will do the most good for each gourde spent. The Haïti Priorise project will work with stakeholders across the country to find, analyze, rank and disseminate the best solutions for the country. We engage Haitans from all parts of society, through readers of newspapers, along with NGOs, decision makers, sector experts and businesses to propose the best solutions. We have commissioned some of the best economists from Haiti and the world to calculate the social, environmental and economic costs and benefits of these proposals. This research will help set priorities for the country through a nationwide conversation about what the smart - and not-so-smart - solutions are for Haiti's future.



Haïti Priorise

Un plan de **développement** alternatif

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C O P E N H A G E N C O N S E N S U S C E N T E R

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