2. The short- to medium-term effects of agricultural policies in developing countries

In the case of OECD countries, the OECD has used its Policy Evaluation Model (PEM) to examine the "transfer efficiency" of farm support policies in OECD countries, i.e. the effectiveness of alternative instruments in raising the incomes of farm households relative to the cost to consumers and taxpayers (OECD, 2001). A general finding of this analysis is that, when markets function smoothly, policies that interfere with the functioning of those markets, such as price supports and input subsidies, perform poorly in terms of raising the incomes of farm households, with a significant share of the transfer leaking to input suppliers or leading to deadweight efficiency losses.[1] Thus, a dollar of market price support raises the incomes of farmers by less than half a dollar, while input subsidies increase farm households' incomes by just one third of a dollar. By contrast, payments which distort markets less, such as payments based on area, are considerably more effective at raising farm based incomes. That said, no form of payment linked to farming in any way provides the gain in net income that would result from a fully decoupled income payment. A further finding of OECD work is that market interventions also often have perverse distributional effects, paying more to larger and richer farmers than to smaller and poorer ones, and taking money away from consumers and taxpayers to boost the incomes of households whose incomes are already above average (OECD, 2003a).

The chief reason that market distorting policies are so inefficient is that they stimulate output, and with it the farmer's demand for inputs. This in turn bids up the price of land and purchased factors, such that a large share of the benefits accrues to non-farming landlords and suppliers of purchased inputs. There are several possible reasons why these results might not carry over immediately in the context of low-income countries. One is that the supply response might not occur, because farmers are locked into subsistence farming and, perhaps because of high transaction costs, cannot effectively respond to price signals. A second possibility is that the increased demand for factors is not reflected in higher rental rates or prices for purchased inputs (either because the market is missing or because prices

are determined exogenously). A third is that farmers may own their own land and purchase relatively fewer inputs, implying less scope for the benefits of policy to leak to other agents. A new model, DEVPEM, admits these possibilities.

The purpose of DEVPEM is to illustrate how structural diversity among developing countries, and systemic differences between developed and developing countries, can affect the welfare and distributional outcomes of alternative agricultural policy interventions. DEVPEM departs from PEM by incorporating several specificities of developing countries that are likely to affect the welfare impacts of agricultural policy interventions.

- One important feature of developing country agriculture is the joint role of the farm household as both a producer and consumer of food crops. This means that the effects of policies such as farm price support depend on what happens on both the supply side and the demand side. While higher prices stimulate production, they also raise the opportunity cost of consuming home-produced food. In many developing countries, an important share of farm households are net buyers of food, so raising farm prices could lower incomes for this group (unless they show a sufficient supply response to be transformed into net sellers).

- A second factor is that many farm households confront high transaction costs when selling output or purchasing inputs. In the extreme, these transaction costs may be so high that the farmer remains cut-off from the market altogether, producing only for home consumption (that is, subsistence). Under these circumstances a subsistence farm household may not benefit from higher farm prices, and could in fact lose via induced increases in land rental rates or in the prices paid for purchased inputs.

- A third aspect is that rural households are heterogeneous in terms of their income sources, expenditure patterns and ownership of factors (particularly land), and will therefore be affected diversely by the direct and indirect impacts of policies. A comprehensive model of the agricultural sector in less-developed countries must consider the behaviour of structurally diverse agents, including commercial farms, semi-subsistence and subsistence farms, and landless rural households.

A detailed description of the model is contained in "Modelling the Distributional Impacts of Agricultural Policies in Developing Countries: The Development Policy Evaluation Model (DEVPEM)" (OECD, 2010a) and

"The Development Policy Evaluation Model (DEVPEM): Technical Documentation" (OECD, 2010b). DEVPEM is a disaggregated model of the rural economy, which retains some key aspects of PEM, notably the imperfect transferability of land from one activity to another, which is central to the farmer's ability to respond to policy shocks. As with PEM, output and factor markets are linked, and the effects of policies on household incomes are determined by how those policies alter returns to factors that the household owns (land, labour and capital). The model is static and therefore suitable for analysing policy impacts over the short- to medium-term. As currently structured it does not capture a range of market failures, such as liquidity and risk constraints, that may affect policy outcomes.

DEVPEM models are constructed for six countries, two in Africa (Ghana and Malawi); two in Asia (Bangladesh and Viet Nam); and two in Latin America. The models are constructed using household level data from the FAO's Rural Income Generating Activities (RIGA) and market aggregates from the FAOSTAT database. The virtue of the RIGA database is variables have been standardised across countries, which makes it relatively straightforward to build and parameterise DEVPEM models, and helps ensure comparability across countries.

The six DEVPEM models are relatively stylised, and should not be considered as representing the full structural diversity of these countries or the precise way in which their rural economies function. Rather, the aim is a more modest one of shedding light on how basic structural differences among countries may affect agricultural policy outcomes. Each country model has six household types. There are large, medium and small-scale farm households, and a non-farm household category (which contains agricultural wage earners). The small and medium scale farm households are divided into "remote" and "non-remote" categories, with the former cut off from food markets by prohibitive transaction costs.

We analyse the effects of five different policies in each of the six countries included in the study. Three of the policies are market interventions, in the form of market price support, a production subsidy, and an input subsidy; one of them is a *social transfer*, in the form of an unconditional cash transfer; and one is a *public-good investment* that lowers transaction costs for remote households and facilitates access to markets. We are interested firstly in the ability of each policy to increase the welfare of rural households, and how costs and benefits are distributed across household groups in each country; and secondly in how cost efficient each policy is in terms of raising the welfare of the targeted population for every dollar spent on the policy.[2] In the case of the public good investment, we can measure the welfare benefits that derive from reducing transaction costs, but

cannot say anything about the costs of this policy or its relative cost-effectiveness. The welfare effects are shown in Table 2.1. The main findings are:

- Market price support (MPS) for food crops harms rural non-farm households in five of the six countries, with consumption side losses exceeding any gains from higher wage incomes. The benefits to farm households are typically small, and are concentrated among medium-sized and large farmers. Only in Ghana are there significant benefits across all five farm household groups.

- MPS for livestock products similarly harms rural non-farm households in all six countries. Small farm households are either unaffected or suffer a small welfare loss in all countries but Nicaragua, where they gain significantly. In the two African countries and in Viet Nam effectively no one benefits from the policy. Gains are small in Bangladesh and Guatemala, the only case in which MPS for livestock significantly increases welfare being for medium-sized and large farmers in Nicaragua, a consequence of the large share of livestock in the product mix of Nicaraguan farmers.

- By contrast, there are no significant welfare losses in the rural economy from MPS for cash crops, because there is no domestic consumption. Except in Ghana, where small farmers grow cocoa beans, the welfare effects are negligible for small farmers and non-farm rural households. The gains are significant for medium and large-scale farmers in three of the six countries: Guatemala, Nicaragua and Viet Nam.

- A production subsidy (PS) for the main food crop, which has the same economic effect as a deficiency payment equal to the difference between a target support price and the market price, affects farmers on the producer side in the same way as market price support, but leaves the consumer side unaffected. As a result, no household group loses significantly, although the gains tend to be concentrated among medium and large-scale farmers more than small farmers.

- In contrast with MPS, an input subsidy (IS), modelled as a discount on the price farmers pay for intermediate inputs, benefits "remote" households who are cut off from output markets. Welfare increases are higher for medium and large scale farmers, but significant for small farmers in all countries except Bangladesh. The gains are largest in Viet Nam, where existing use of fertiliser is highest.

Table 2.1. Simulation results of rural household welfare effects of various agricultural policies (% change)

	Ghana	Malawi	Guatemala	Nicaragua	Bangladesh	Viet Nam
Market price support, food						
Non-farm	-0.11	-1.71	-0.25	0.31	-0.81	-0.89
Small remote	2.60	-0.08	-0.03	0.29	-0.04	0.30
Small non-remote	1.29	-0.93	0.03	0.49	-0.06	0.30
Medium remote	0.68	-0.13	-0.04	0.16	-0.44	-0.51
Medium non-remote	2.32	0.25	0.26	0.63	0.91	1.46
Large farm	2.29	1.22	0.40	0.28	1.02	1.05
Market price support, cash crop						
Non-farm	0.34	0.00	0.23	0.44	0.01	0.15
Small remote	1.26	-0.08	0.62	0.68	0.06	0.13
Small non-remote	0.11	-0.04	0.25	0.34	0.07	0.20
Medium remote	1.15	0.59	2.70	2.04	0.16	1.04
Medium non-remote	0.47	0.44	1.78	2.20	0.26	1.14
Large farm	0.78	0.12	1.77	2.18	0.27	5.09
Market price support, livestock						
Non-farm	-0.34	-1.37	-1.13	-0.21	-0.56	-1.36
Small remote	-0.03	-0.01	-0.02	2.31	-0.15	-0.67
Small non-remote	0.04	-0.38	-0.32	0.92	0.07	-0.38
Medium remote	0.04	-0.01	-0.01	3.93	-0.22	-0.53
Medium non-remote	0.15	0.05	0.76	1.89	0.53	0.13
Large farm	0.02	0.23	1.49	3.67	0.61	0.16
Production subsidy, food staple						
Non-farm	1.68	0.01	0.04	0.42	0.12	0.32
Small remote	2.60	-0.08	-0.03	0.29	-0.04	0.30
Small non-remote	3.04	0.67	0.38	0.59	0.60	1.21
Medium remote	0.68	-0.13	-0.04	0.16	-0.44	-0.51
Medium non-remote	4.08	1.13	0.56	0.71	1.66	2.32
Large farm	3.68	1.74	0.57	0.35	1.57	1.82
Input subsidy						
Non-farm	0.28	0.14	0.03	0.13	0.03	0.41
Small remote	0.77	0.56	0.56	0.26	0.16	1.61
Small Non-remote	0.46	0.53	0.10	0.22	0.19	0.85
Medium remote	1.25	0.80	0.72	0.59	0.62	2.54
Medium non-remote	0.88	0.88	0.88	0.67	0.56	1.77
Large farm	1.14	1.03	1.20	0.68	0.37	2.80
Public-good investment						
Non-farm	0.2	0.0	0.1	0.4	0.0	0.1
Small remote	1.2	0.1	1.3	3.5	0.1	1.2
Small non-remote	0.1	0.0	0.0	0.1	0.0	0.1
Medium remote	3.5	0.7	4.4	7.2	0.2	5.3
Medium non-remote	0.0	0.0	-0.1	-0.1	0.0	-0.2
Large farm	-0.1	-0.1	-0.2	-1.1	0.0	-0.5

Note: The market price support simulations assume a 10% exogenous price increase in the targeted commodity. The production subsidy simulations assume that farmers are given a 10% subsidy for all output produced of the targeted commodity. The input subsidy simulation assumes that farmers are given vouchers, which gives them 10% discount on the targeted agricultural input. The public-good investment simulation assumes that transaction costs are eliminated for households located remotely from markets.
Source: OECD (2011).

- The input subsidy experiment is run under the assumption that the price of inputs is endogenously determined. If input prices are exogenous, i.e. set at the world market level plus a fixed per unit distribution cost, then the gains approximately double for each household group.[3]

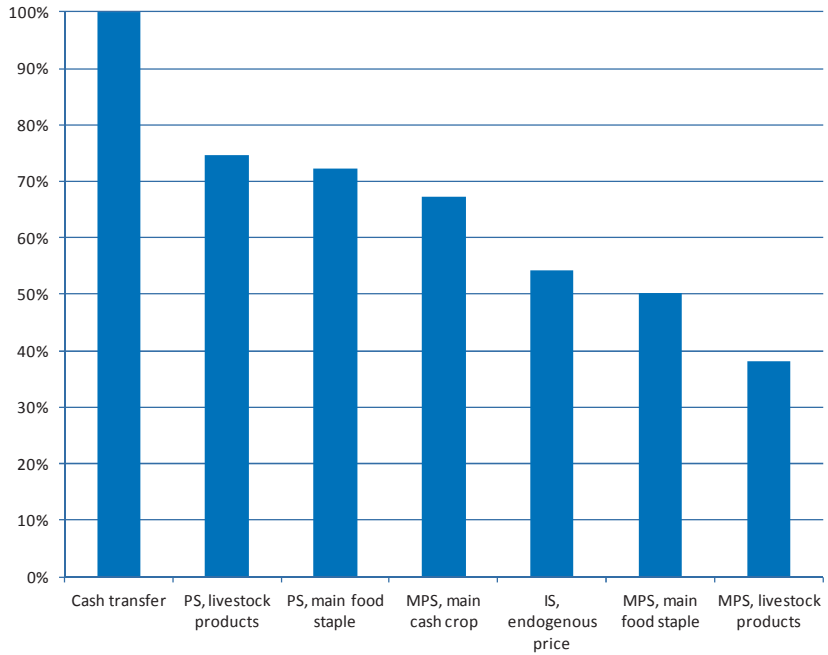
- When households receive an unconditional transfer equal to 1% of their original income, they also observe a 1% increase in their final welfare, with general equilibrium effects (e.g. as a result of households switching between activities) not significant.

We measure the cost efficiency of alternative instruments as the overall change in rural welfare divided by the cost to urban taxpayers and (in the case of food price support) consumers. The average efficiency across all six countries is shown in Figure 2.1. The benchmark experiment of an unconditional cash transfer, as designed, has a cost efficiency of 100%. Among policies that involve interventions in commodity markets, those without negative consumer side-effects have higher levels of efficiency. The efficiency of the production subsidy exceeds 70%, while the efficiency of MPS to cash crops is on average 67%. The policies with the lowest levels of efficiency are those that harm rural households on the consumption side, namely price supports for food crops and livestock products, with efficiency levels below 50% in many cases. The efficiency of input subsidies is low (54%) on the assumption that prices are determined endogenously, but much higher if prices are taken to be exogenous (over 90%).

The first conclusion from these policy experiments is that no untargeted agricultural policy intervention is pro-poor within the rural economy. Market price support for food crops harms net buyers of food, often the poorest farm and non-farm (landless) households, although the proportion of net buyers varies significantly across countries.[4] Support for cash crops does not have this drawback; however, cash crops are typically grown by farmers with relatively high incomes, so support seldom reaches the incomes of the poorest.

While all agricultural policy instruments are less efficient than a simple cash payment (in terms of net rural benefits relative to urban cost), the degree of inefficiency of some market interventions, notably input subsidies, is not inevitably as high as observed in developed OECD countries. The reason is that farmers are less likely to rent land than in OECD countries and they tend to purchase fewer inputs, which in turn implies fewer leakages away from the farm level. This result may have implications if agricultural policies can be targeted and if other factors germane to policy design and implementation are sufficiently important.

Figure 2.1. Cost efficiency of various agricultural policies (averaged across the six countries)



Source: DEVPEM simulation results, Annex 1, "Modelling the Distributional Implications of Agricultural Policies in Developing Countries: The Development Policy Evaluation Model (DEVPEM)".

Given that a cash transfer is the most efficient instrument, and can in principle be targeted to low income households, the justification for using an alternative instrument must come from some effect which is not captured by the DEVPEM model. One is the possibility of administrative difficulties with cash-based programmes, for example due to the absence of a population registry, or because of concerns about corruption (although these concerns also apply to other instruments). Another is the possibility of dynamic gains from market interventions, in terms of enabling farmers to overcome market failures and break out of "poverty traps." The latter has been invoked as a justification for input subsidies (Dorward, 2009).

Input subsidies tend to benefit those farmers who are using inputs already – often larger farmers. The extent to which the benefits of support are retained by farmers depends partly on the degree to which the price of inputs rises in response to the increase in input demand. Parallel investments that increase distribution capacity and help keep marginal distribution costs constant would reduce the leakage of benefits away from the farmer. Input

subsidies can also in principle be targeted to improve their distributional outcomes. A wide range of other pros and cons are relevant when considering whether input subsidies are a relevant policy option; these are taken up in Section 6.

A significant finding is that a public investment which reduces transaction costs is the only pro-poor instrument, since it helps remote farm households, who are typically poorer than those engaged with markets. However, we do not know the cost of generating these improvements. If those investments bring down marginal input distribution costs, they could also improve the effectiveness of input subsidies. The implication here is that, if input subsidies are to be used, they should be accompanied by investments in infrastructure. Moreover, weak infrastructure, which impedes market profitability, is often a reason for farmers failing to use inputs in the first place – so such investment could replace as well as complement an input subsidy.

In general, the results show that direct payments are the most efficient way of boosting incomes in the short-term, while public investments, which should also have broader long-term pay-offs, have short to medium-term impacts that are pro-poor. These results are therefore fully consistent with the best practice advice established for OECD countries of using social policies to safeguard incomes in the short term, and non-distorting public investments to boost competitiveness in the long term. Whether there are caveats to this advice depends on whether considerations outside the model are sufficiently important to offset the shortcomings of market interventions on both efficiency and equity criteria. These are taken up in Section 5, which considers whether there is a role for government in stabilising markets, and Section 6, which considers the arguments for and against using input subsidies.

Notes

1. The deadweight losses reported here are the consequence of domestic resource allocation effects and, in the case of exporting countries, include transfers to overseas consumers via lower world prices.
2. Market prices could of course be suppressed in order to benefit urban consumers. In this case, the results would be the mirror of those reported here.
3. The nature of the domestic market for fertiliser will be context specific. We assume rising internal distribution costs, reflecting infrastructure bottlenecks, which are reflected in a supply elasticity of 2.0. Quizón and Binswanger (1986) in an application to India assume a higher elasticity of 4.0, based on openness to trade. Ryan and Perrin (1974) in an examination of the market for potatoes in Peru argue that it is plausible to assume perfectly elastic supplies, since fertiliser is imported. We adopt the latter as an alternative assumption.
4. In an analysis of eleven countries for which RIGA data are available, Zezza *et al*. (2008) find that rural net buyers of food outnumber rural net sellers in all but one country (Viet Nam).