Who are the producers and consumers? Value chains and food policy effects in the wheat sector in Pakistan

Elena Briones Alonso [a,*], Johan Swinnen [a,b]

[a] LICOS Centre for Institutions and Economic Performance, KU Leuven, Waaistraat 6 bus 3511, 3000 Leuven, Belgium
[b] Centre for Food Security and the Environment, Stanford University, 616 Serra St C100, Stanford, CA 94305-6055, United States

A B S T R A C T

We develop a disaggregated Nominal Rate of Assistance (NRA) methodology to disentangle the welfare impacts of policies for various interest groups along the value chain (to disaggregate effects within the "producer" and "consumer" umbrellas). We apply our value chain NRA methodology to the case of Pakistan's wheat price and trade policy. We analyze the welfare implications for various agents in the wheat-flour value chain from 2000 to 2013, a period characterized by major global price volatility and by regular adjustments of domestic policies. We find that the wheat policy has generally benefitted flour consumers and wheat traders at the expense of wheat farmers, with limited effects on flour millers. Our findings illustrate that the welfare implications of policies can be quite different within the "producer" and "consumer" umbrellas, which has potentially important implications for economic and political economy analyses and for the design of policies that aim to target the poorest groups along value chains.

© 2016 Elsevier Ltd. All rights reserved.

Introduction

Public policies typically affect many agents in the economy, and these agents may lobby governments to introduce or remove certain policies. For agricultural and food policies these agents include various input suppliers (e.g. land owners, seed and agro-chemical companies, rural banks) and farmers on the upstream side of the value chain and traders, food processors, retail companies and households on the downstream side of the value chain. These agents may be differently affected by policies depending on the nature of the policy (e.g. whether the policy targets the (raw) agricultural commodity, such as price support for grain, or a processed commodity, such as import tariffs on bread or cheese).[1] As a consequence, different agents along the value chain have sometimes joined forces ("political coalitions") to influence policy makers in setting public policies (see e.g. Bellemare and Carnes, 2015).

In economic theory, policy analysis and political economy models these various agents are often aggregated into three groups – "producers", "consumers", and "taxpayers" – to study the welfare impacts and incentive effects of policies and rent (re-)distribution.

One reason for the use of producer–consumer models to analyze the welfare effects of policies is of course their didactic use in theory, i.e. to avoid unnecessary complications when deriving policy effects and identifying equilibria. Another reason is empirical: there is often no detailed empirical information on policy impacts on various agents. However, if we want to assess whether the benefits of the policy are well targeted to the groups that need them most, or who is bearing the cost of the policy, it may be important to have information on the distribution of policy rents between different agents within the aggregate producer–consumer groups. One can think of examples where "producers" may include both wealthy land owners and poor tenant farmers, and "consumers" may include both multinational food companies and poor households.

A major contribution to empirical agricultural and food policy analysis in recent years is the World Bank project on "Distortions to Agricultural Incentives", coordinated by Kym Anderson. The project resulted in a major new dataset on measures of the effects of agricultural and food policies, and a growing number of studies using and explaining food policy distortions (e.g. Anderson, 2009; Anderson et al., 2008, 2013; Anderson and Nelgen, 2013; Garmann, 2014; Huang et al., 2009; Olper and Swinnen, 2013; Olper et al., 2014). The project has made a major contribution to

---

* Corresponding author.
  E-mail addresses: Elena.Brionesalonso@kuleuven.be (E. Briones Alonso), Jo. Swinnen@kuleuven.be (J. Swinnen).
[1] The distribution of rents or taxes among different agents depends on a variety of factors, including concentration at different stages of the chain and supply and demand elasticities. For instance, it is well known that land owners often capture part of the subsidies to farmers and that this capture depends on the nature of the subsidies, market imperfections and the supply elasticity of land (e.g. Ciaian and Swinnen, 2006, 2009; Goodwin et al., 2011; Latruffe and Le Mouël, 2009; Patton et al., 2008).

empirical analysis by vastly extending the coverage of policy indicators over time and across different countries and regions.

As most other projects before, the indicators produced by the project measure how much producers and consumers are taxed or subsidized through various policies. The most important indicators are the nominal rate of assistance to agriculture (NRA), the relative rate of assistance to agriculture (RRA) and the consumer tax equivalent (CTE). In these indicators producers and consumers are a combination of different agents (interest groups). Therefore one needs to interpret the numbers carefully (both from an economic and political economy perspective) to reach the correct interpretation of the impacts.

To illustrate this, consider the NRA for a product such as sugar. The NRA is measured as the ratio between the domestic price of sugar and the world market price plus any additional domestic taxes and/or subsidies (see e.g. Anderson et al., 2008). Non-distortionary price effects, i.e. price effects that are not due to market imperfections or government distortions, are netted out from the NRA. These non-distortionary effects can include international and domestic trading costs, quality differences between domestic and imported varieties and non-distortionary price wedges along the value chain such as processing costs and retail marketing margins. When government intervention takes place beyond the farm gate, for instance in post-farm processing or trading activities, the NRA takes into account the pass-through of these interventions to the prices faced by farmers or final consumers. Another issue arises when the primary product for sugar (cane or beet) is not the same as the final product purchased by consumers (refined sugar). Since one primary product may be used in many different value chains and it is difficult to trace price changes through all these value chains, the CTE is usually expressed at the level at which a product is first traded.

The NRA for sugar is thus interpreted as how much explicit and implicit subsidies producers get. Inversely, it is interpreted as how much consumers get taxed or subsidized (the CTE is the negative NRA plus any additional direct consumer taxes or subsidies). But who are these "consumers" and "producers"? When the NRA is measured at the level of sugar, i.e. the processed product that is traded, the "producers" include both sugar processing companies and the farmers producing sugar cane or sugar beet. Other agents, such as land owners and agribusinesses supplying inputs to the farmers, may also be affected by the government policies and the impacts on them are also captured by the NRA. This means that it is not clear from the NRA indicator how policies affect specific agents within the producer group.

The same issue also applies to the "consumer" side. Some sugar is "consumed" directly by households, but most is sold to the food industry, which uses the sugar in various products sold to retailers and only then households consume the sugar.[2] Hence, the impact on all these groups are part of the NRA/CTE effects, but the NRA/CTE indicator does not provide specific information about each group's welfare impacts.

In this paper we will try to disentangle some of these distortions/rents among interest groups within the consumer and producer groups. We explicitly consider the impact on several groups along the value chain. To do so, we first develop a disaggregated NRA indicator to measure these different distortions/rents along the value chain. We then apply this approach to the wheat-flour value chain in Pakistan.[3] This is an interesting case

since (a) wheat is a very important staple food in Pakistan[4]; (b) Pakistan is a country with significant poverty and food insecurity[5]; (c) the government intervenes heavily at various stages of the wheat-flour chain; and (d) these interventions have been criticized for being distortionary and ineffective (Cummings et al., 2006; Dorosh and Salam, 2007, 2008, 2009; Prikhodko and Zrilyi, 2013; World Bank, 2010). We calculate the welfare implications for various agents in the chain for the years 2000–2013, a period characterized by major price volatility in global wheat and flour markets and by regular adjustments of domestic policies.

A value chain approach to measuring distortions and policy rents

The NRA measures the extent of distortions to producer and consumer price incentives generated by direct and indirect government intervention at the border and in domestic markets. We disaggregate the methodology of Anderson et al. (2008) and Anderson (2009) to measure the welfare effects of government interventions for different agents along the value chain. Government policies can affect the welfare of agent i in the value chain by changing input or output prices and/or by providing direct subsidies or taxes. The NRA to agent i in a vertical chain is calculated as follows[6]:

$$\text{NRA}^i = \frac{(p_o^i - p_o^{i*}) * Q_o^i + \Sigma_j (p_j^{i*} - p_j^i) * Q_j^i}{p_o^{i*} * Q_o^i} \quad (1)$$

where p_o^i is the actual domestic price of output o, p_o^{i*} is the 'undistorted' domestic output price, i.e. the price without government intervention, Q_o^i is the quantity of output sold, p_j^i is the actual domestic price of input j, p_j^{i*} is the 'undistorted' domestic price of input j and Q_j^i is the quantity of input j used to produce output o. The NRA to agent i can therefore be rewritten as:

$$\text{NRA}^i = \frac{p_o^i - p_o^{i*}}{p_o^{i*}} + \frac{\Sigma_j (p_j^{i*} - p_j^i) * Q_j^i / Q_o^i}{p_o^{i*}} \quad (2)$$
$$= \text{NRA}_O^i + \text{NRA}_I^i$$

where Q_j^i / Q_o^i represents the conversion rate from input j to output o. The NRA to output, NRA_o^i, measures the extent of distortions to output prices expressed as a percentage of the undistorted domestic output price. The NRA to input, NRA_I^i, measures the total extent of distortions to input prices for all inputs j used to produce output o, expressed as a percentage of the undistorted output price. The total NRA^i to agent i is the sum of both.

We now apply this approach to the wheat-flour value chain in Pakistan. Before doing the calculations we give a brief review of the policies causing distortions and rent distribution in Pakistan's wheat-flour chain.[7]

---

[2] For example, in early 2015 the EU's beverage and confection industries and sweetener companies lined up to lobby the EU decision-makers against the extension of the EU sugar quota. These mostly large food companies are included under the "consumer" heading in the indicators. On the other side of the lobbying campaign are farmers and sugar companies – both captured by the "producer" indicator.

[3] Our approach is related to the analysis of Ivanova et al. (1995) and Swinnen (1998) of rents in the wheat-flour chain in Bulgaria.

[4] Wheat is the most important agricultural crop and staple food in Pakistan, grown by 80% of farmers (United States Department of Agriculture [USDA], 2014). Wheat flour consumption per capita in Pakistan is one of the highest in the world, accounting for about 37% of daily caloric consumption on average (Prikhodko and Zrilyi, 2013). Hence, both farmer income and food security are to a large extent associated with wheat production and consumption, in particular among the many poor.

[5] An estimated 17–38% of the population is classified as poor and 56% is considered vulnerable, i.e. being poor or likely to become poor after a shock (World Bank, 2010).

[6] This formula does not include direct subsidies or taxes since these are not relevant for our empirical case. Including these, the general formula would be $\text{NRA}^i = \frac{(p_o^i - p_o^{i*}) * Q_o^i + \Sigma_j (p_j^{i*} - p_j^i) * Q_j^i + z_i}{p_o^{i*} * Q_o^i}$ where z_i represents net direct subsidies to agent i.

[7] For more details see Dorosh and Salam (2007, 2008), International Finance Corporation [IFC] (2011), Lohano et al. (1998), Prikhodko and Zrilyi (2013), Ahmad et al. (2006), United States Agency for International Development [USAID] (2009) and Zahid et al. (2007).