Viable Alternatives to tobacco growing: An economic model for implementing Articles 17 and 18

FCTC
WHO FRAMEWORK CONVENTION
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Acknowledgements

1. Introduction

There are 1.1 billion tobacco consumers in the world, which is expected to increase to 1.6 billion by 2035.[1] Consumption of tobacco products is increasing globally, though it is decreasing in some high-income and upper middle-income countries. Nearly 80% of the world's one billion smokers live in low and middle-income countries. In developing countries, smokers spend sometimes as much as 30% of their income on tobacco, thus, reducing their expenditure on nutrition, education and health care. 100 million people died from tobacco-related diseases in the 20th century and 1 billion people could die this century from tobacco-related diseases. Tobacco kills up to 50% of the people who use it or rather abuse it.[2]

Given the urgency of the problem, the WHO Framework Convention on Tobacco Control; the world's first public health treaty, has about 180 Parties representing over 87% of global population. In 2008, the Third Conference of the Parties (COP3) of the FCTC established a working group on economically sustainable alternatives to tobacco growing.[3] Its task was to develop policy options and recommendations for the implementation of Articles 17 and 18. While several countries have different schemes, some of which have succeeded; evidence on such schemes is of a scattered nature. Schemes are of an anecdotal nature based on the experiences of other similar countries. While an exchange of ideas on Best Practices and implementation difficulties is required, it is necessary to have a strategic approach to sustainable alternatives to tobacco growing.

This paper will highlight a conceptual framework for a strategic approach to tobacco control. The bottom line is clear: reducing tobacco use is good for health and should make sound economic sense. Most nations should derive net economic gains, not losses, if their demand for tobacco products fell, because economic losses would be offset by economic gains at household and national levels. Clearly some groups would benefit, and others would suffer losses, and countries might choose to compensate or assist vulnerable groups who might be affected by tobacco control policies.

This paper uses a holistic approach in providing a modelling framework for implementing Articles 17 and 18 of the FCTC. The idea behind this holistic conceptual framework is that alternatives to tobacco growing should not be sought only in the agricultural sector, but rather in the whole economy. The

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[1] ASH (Action on Smoking and Health). "Tobacco Statistics and Facts". Available at: http://ash.org/programs/tobacco-statistics-facts/
[2] Ibid
[3] Since 2006, a study group had been conducting research and consultations on these articles. This group was replaced by the working group in 2008. Source: FCTC (2009): "Conference of the Parties to the WHO Framework Convention on Tobacco Control". Geneva, Decision FCTC COP3 (16), Available at: http://apps.who.int/gb/fctc/PDF/cop3/FCTC_COP3_REC1-en.pdf

manufacturing sector, the services sectors along with the non-farm sector should also provide alternative livelihoods to tobacco growing. But how do we find these alternatives?

In this paper, a cumulative general equilibrium (CGE) model is used. The basic assumption of this model is that if the tobacco sector declines, the resources are released and used elsewhere in the economy. The places where these resources are used depend on the relative strength of the sectors. They are essentially used in the most efficient sectors of the economy.

The paper is organised as follows. Section 2 outlines a modelling approach to understanding the effects of tobacco control on the economy. The first approach outlined is a Partial Equilibrium (PE) modelling approach and the second is a CGE approach. Section 3 shows and discusses the results for Tanzania of the modelling exercise. Section 4 shows some examples of tobacco control measures from all the nine countries and discusses their efficacy. Section 5 draws up some conclusions and suggests a way forward.

2. The Modelling Approaches

This section will try to explain conceptually exactly what happens in the economy when prevalence is exogenously decreased. The FCTC's target is to reduce prevalence of tobacco by 30% in all countries by 2025. This does not however mean that tobacco consumption will reduce by 30%. Reducing the share of population, which consumes tobacco by 30%, would reduce consumption by less (generally) or more depending on the per capita consumption, population and existing prevalence rate.

2.1 PE approach

In the PE approach, prevalence is a policy variable that is shocked from outside the model (exogenous). Prevalence is defined as the ratio of people who consume tobacco and its products to the total population in a given country. Tobacco consumption here refers mainly to consumption of cigarettes and cigars, as around 75% of tobacco leaves grown globally are used for cigarettes.[4] Tobacco consumption can be derived in a simple way from prevalence, by multiplying the latter with average per-capita consumption of tobacco and population. Countries are required to provide information on prevalence rate, per capita tobacco consumption and population.

Thus, when prevalence decreases and population increases, tobacco consumption can change in any direction, depending on whether prevalence or population changes the most. Until this part, there is no behavioural parameter involved and the model is plain algebra, as follows:

Tobacco Consumption = Prevalence * Population * Per-capita Tobacco Consumption-

At the same time,

Tobacco Consumption = Domestic production of tobacco – exports + imports

Equating the two sides we get

DP - X+M =Pre*pop*PCTC

Or DP = Pre*pop*PCTC - M + X

Emp = DP*Employment Multiplier

Where

DP = Domestic Production

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[4] Anne- Marie Perucic, 2012. "The Demand for cigarettes and other tobacco products", Tobacco Control Economics, Tobacco Free Initiative, WHO (TobTaxy Capacity Building Workshop: 20-22 February 2012, Dublin, Ireland), 7

Pre = Prevalence

Pop = Population

PCTC = Per Capita Tobacco Consumption

M = Imports

X = Exports

For this simple partial equilibrium model for the purposes of the simulation it will be assumed that Per Capita Tobacco Consumption does not grow between 2010 and 2025. Later more realistic assumptions about behavioural changes in per capita tobacco consumption in response to income and price changes can be introduced. A more sophisticated approach with more complicated behavioural parameters is attached in Annex 1. The purpose over here is to help countries do some back of the envelope calculations to estimate employment effects of reduced prevalence.

This is too simple an approach and has the limitations of not being comprehensive enough in an economy-wide sense. It is also unable to give us a comprehensive picture of tobacco markets, as it ignores the input-output linkages involved in the supply chain of tobacco and its products. Further, effects on other sectors as well as broad macro-economic effects are not captured in this model. It also ignores international effects emanating from trade with the rest of the world.

2.2 CGE approach

To address the limitations above, a full-fledged global CGE model with comprehensive details on tobacco and tobacco products sectors can be developed. This is based on the GTAP-E model and database, further augmented significantly by country-specific data on tobacco crop and tobacco products, from various national and international sources. Particular sources include FAO for production and prices of tobacco crop, UN commodity statistics as well as National Accounts Statistics for production of tobacco products, ITC dataset for trade and tariffs in these sectors and consumption data from National Accounts Statistics.

Such a model captures supply-chain effects, macro-economic aspects, economy-wide equilibrium constraints, linkages between different sectors and countries, as well as emissions and land use effects of different commodities. This model can also captures the potential substitution of tobacco by other crops in the case of former's decline. The model can also derive the effects of tobacco control policy in terms of reduction in production and trade of this sector.

The objective of the analysis proposed is to identify the extent to which a policy-induced (FCTC) reduction in prevalence of tobacco consumption gets translated into reduction in trade, production

and employment of tobacco farmers. At the same time the model throws up alternatives to tobacco which would be economically viable in all the three major sectors of the economy viz. agriculture, manufacturing and services.

The basic logic of the CGE framework is that when resources such as land, labour, capital and entrepreneurship are released from one sector it goes to other sectors. But how are these sectors determined? They are determined by the comparative advantage that an economy has in those sectors as such sectors would be growing and can absorb the released resources. The government can also direct these released resources to the sectors that it wants to develop through incentives.

Each country can conduct a CGE analysis for its economy. It would need to have an input-output model for the economy. This can be updated with the National account statistics, Household survey data, FAO data, ITC dataset and other sources.

3. Using the two models in Tanzania: A summary of results

The study conducted for the WHO used both partial equilibrium (PE) and Computable general equilibrium (CGE) modelling exercises to arrive at the effects of decreasing tobacco prevalence in Tanzania. PE gave the sectoral effects by capturing the supply demand linkages in the tobacco sector, while CGE provided economy wide perspectives, since effects would be felt on other sectors as well on s broad macro-economic parameters. The CGE model used was the Global Trade Analysis Program-Environment (GTAP-E) and database, which has comprehensive details on tobacco and tobacco products/sectors. The database was augmented with country-specific information on tobacco crop and tobacco products, from national and international sources. The base year for the augmented GTAP database is 2015. A policy shock of 30% reduction in consumption of tobacco and tobacco products by households, exports and imports was applied to the GTAP model.

3.1 Results

The PE model indicated that overall there would be approximately 10% decline in employment in tobacco sector and a 9% decline in total tobacco consumption in Tanzania by 2030. Production and exports may also decline by 8-9%, if tobacco product prices increase at their current growth rates and if the Tanzanian economy grows at over 6.1% per annum.

The picture from the CGE analysis is however, entirely different. The GTAP results indicate that the percent changes in raw tobacco employment are much higher than those in tobacco products. This is because reduction in raw tobacco affects the economy in two different ways; first, the direct reduction

in demand for raw tobacco; second, the indirect reduction of demand for tobacco products. While these declines are important they are not significant if compensated by other sectors. Also, when the demand for raw tobacco falls, it pulls down its supply as well, thereby reducing the production of raw tobacco. Thus, demand for labor falls, and so do wages in the raw tobacco sector. Emissions associated with raw tobacco as well as the land use associated with it falls strongly, because of fall in production, as shown in table 1.

Tobacco products also decline as a result of reduction in their domestic, import and export demand. This results in the reduction of their employment and wages. On the other hand, emissions decrease due to reduced production. However, this has no direct implication for agricultural land use since tobacco products do not employ such land. Overall, the economy-wide employment may fall by less than a per cent; emissions also get reduced by the same amount. The most visible effects are on real wages, which could be compensated by increased expenditure by the government in retraining workers to work in other sectors of the economy. Initially, some assistance may also need to be provided to the displaced workers from the tobacco

Table 1: % Changes in different variables due to prevalence reduction

Variable	Raw Tobacco	Tobacco Products	Overall Economy
Employment	-20.3	-7.8	-0.52
Wages	-10.4	-3.5	-2.6
Emissions	-22.1	-8.4	-0.74
Land use	-18.2	NA	0

Reduction in tobacco consumption could be compensated by an increase in consumption of other consumer products which should generate demand and employment in other sectors especially in most manufacturing and services sectors as seen in Table 2.

Table 2: Sectoral Employment Gains (in %) due to prevalence reduction

Sectors	% Change
Wheat	0.28
Plant Fibers: cotton, flax, hemp, sisal	0.74
Other Crops: live plants; cut flowers and flower buds	0.72
Vegetable Oils	0.36
Sugar	0.42

Textiles	0.63
Leather	0.48
Wood and products of wood	0.41
Paper & Paper Products	0.95
Chemical Rubber Products	0.81
Non-Metallic Minerals	0.10
Iron & Steel	0.67
Non-Ferrous Metals	1.25
Motor vehicles and parts	0.49
Other Transport Equipment	0.87
Electronic Equipment	0.96
Other Machinery & Equipment	0.87
Other Manufacturing: includes recycling	1.11
Water: collection, purification and distribution	0.36
Other Transport	0.05
Other Financial Intermediation	0.18
Insurance	0.51
Other Business Services	0.08
Recreation & Other Services	0.08
Other Services (Government)	2.08

This increase in employment would more than compensate for the decrease in employment emanating from tobacco control. Some additional observations are interesting. Tobacco cultivation employs about 0.4% of the total land that is worth about 22 billion US$. Around a third of this would be released because of the reduction in tobacco cultivation, amounting to about 0.2% higher forest cover in value terms. Exports of forest products would consequently increase be over 0.8%. This would compensate for the decline in export revenue from tobacco leaf exports, which the model showed would be about 0.06%. Thus, while a decline in employment, export revenue, wages and output is to be expected, such losses will be broadly compensated by absorption of labor in other expanding sectors, both from the demand and supply side.

It is important to situate these results in the context of the Tanzanian economy and its realities. Does the model results really capture the realities of the tobacco sector in Tanzania? It is an important tobacco producer but does not figure amongst the top 10. From 2005 till 2010, there was a drastic increase in production of tobacco from 22 million kg to 59 million kg. The income of the farmers also increased in this period, from TZS 300,000 per hectare to TZS 500,000 per hectare. This was possible as the government supported production by providing financial assistance and allocating land to the farmers for growing tobacco. As tobacco production is a labor-intensive and a profitable crop, it helped to create employment, reduce poverty and brought higher earnings from exports and tax revenues. Tax revenue collected in the last five years amounted to TZS 340 billion, according to government sources.[5] The important issue here is whether tobacco would be still profitable if government support were removed? The answer is no.

The model shows that deforestation is an important outcome of tobacco growing and this would be reversed at least partly by tobacco control measures. This result is corroborated by the fact that curing of tobacco leaves itself requires large amounts of fuel wood, thus clearing large tracts of woodlands. This leads to large-scale deforestation and soil erosion, thereby reducing the productivity of the land to grow any other crops. In the Urambo region, clearing the land for tobacco growing contributed to 3.5% of deforestation. Another 3% is added when farmers use an average of 23m3 wood for curing the leaves. The Miombo Forests in the Tabora Region have also declined considerably because of this.[6] Hence, decrease in prevalence would release forest resources for other activities as well as improve exports of forest products. If the cost of land as shown above is factored in the cost of tobacco growing, other crops would look more profitable.

As tobacco is a labor-intensive crop, even children and women are involved in growing it. They fall in the category of unpaid workers who work to supplement their family income. A case study by Rapid Assessment (RAS) by ILO for the "Elimination of Child Labour" (IPEC) in Tabora Region, Tanzania highlighted the problem in the villages of Uyui, Urambo and Kaliua. Some of the key findings were that firstly, children had been engaged in tobacco growing from the ages of 5-11 years. Thus, they were robbed of education and exposed to harmful working conditions since a young age. They were mostly

[5] Asmerom Kidane, John Mduma, Alexis Naho, and Teh-wei Hu, 2016 "Economic returns and comparative costs of farming tobacco, maize, and groundnuts: The case of the Tabora region in Tanzania", African Statistical Journal Journal africain de statistiques Volume 19, 44,45. Source: Kishweko, O. (2011). "Tanzanian Tobacco Budding in the Global Market." (Unpublished manuscript)
[6] ASH, 2009, Tobacco and the Environment", ASH ORG, 3, Available at:
http://www.fastforward.org.uk/assets/downloads/ASH%20Scotland%20-%20Tobacco%20and%20the%20environment.pdf,
 Source: Mangora, M. Ecological impact of tobacco farming in miombo woodlands of Urambo District, Tanzania. African Journal of Ecology. 2006. 43:4: 385-391. Published online 13 Jan 2006. Waluye, J. Presentation at the 13th Annual World Conference on Tobacco or Health.

from poor households where the parents themselves had completed only primary education.[7] While modelling cannot capture this effect, it is nevertheless an important factor to be considered.

Tobacco farming involves handling of nicotine and other chemicals and pesticides that get into the farmer's skin causing "Green Leaf sickness". It was observed that the farmers also chewed tobacco leading to addiction. [8] Children also working for long hours in the harmful conditions were exposed to insect, snakebites amongst other diseases, thus leading to both a short and long term impact on the health and education of children. [9] Farmers were also caught in a vicious circle of poverty and debt because of unfair pricing practices.[10] If these factors are costed then there will be net gains from tobacco control. In creating a holistic approach, these issues also need to be considered.

Turning to the alternatives thrown by the model, the Tanzania Tobacco Control Forum (TTCF) promoted adoption of alternative crops such as rice, ground nuts, sunflower, sesame etc. in the Namtumbo district of Tanzania. The model does show that vegetable oils would be an important employment generator. From 2006-2014, production of maize (352%), Rice (277%), Sunflower (247.6%) and Pigeon Peas (5,739%) had increased. Tobacco on the other hand increased by 483% from 2006-2010 and then declined by 79.6% by 2014.[11] Interactions with the farmers revealed that despite the fact that capital was not available for oil extraction machines, they sold raw alternative crops and made some profit on it. This further instilled confidence in farmers to keep farming other crops. Purchasers also procured the crops directly from the farmers thus, leading to a direct market with no middlemen. This led to more income in the hands of the farmers, and an improved standard of living for the farmers wherein they could send their children to school, educate them and take care of their family's health. In September 2010, it was observed that 72% of Namtumbo farmers, grew alternative crops and the remaining farmers were also reducing their tobacco acreage for growing alternative crops.

However, despite this success it was important to provide a market for these crops, as there were many sellers but limited buyers. TTCF, Ministry of Agriculture, Food Security and Co-operatives worked

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[7] International Programme on Eliminating Child Labour International Labour Organization (ILO) 2016, "RAPID ASSESSMENT ON CHILD LABOUR IN TOBACCO GROWING COMMUNITIES IN TABORA REGION, TANZANIA", 1,8; Source: ILO (2002) Every Child Counts: New Global Estimates on Child Labour, ILO Geneva. Rapid Assessment of Child Labour in Tobacco Growing Communities in Tabora Region from December 2015 to January 2016.

[8] Tasneem Hassanali, May 2016, "The Crusade towards a Tobacco free Tanzania", Available at:
http://www.thecitizen.co.tz/magazine/success/The-crusade-towards-a-tobacco-free-Tanzania/1843788-3226350-c7hamtz/index.html
[9] International Programme on Eliminating Child Labour International Labour Organization (ILO) 2016, "RAPID ASSESSMENT ON CHILD LABOUR IN TOBACCO GROWING COMMUNITIES IN TABORA REGION, TANZANIA", 43
[10] Tasneem Hassanali, May 2016, op.cit
[11] Lutgard Kokulinda Kagaruki, Executive Director, Tanzania Tobacco Control Forum "Farmers and other victims of Tobacco"; 2, Available at:
file:///Users/Aniyarijain/Downloads/Pull%20Out%20Delhi%20Day%204_WEB%20(6).pdf

with the Tanzania Warehouse Licensing Board (TWLB) to start the "Warehouse Receipt Project". In this, the farmers received 70% of the value of their crops by depositing some produce with the warehouse. The TWLB then assembled the required markets for the crops, which after sale provided the farmers with the remaining 30% payment. This helped them to secure their income, earn profits, improve their standard of living and continue growing alternative crops for a sustainable environment. [12]

While agricultural alternatives have been experimented by Tanzania, the model shows that other alternatives in the manufacturing and services sectors should also be explored. Also the number of people displaced by the tobacco control measures who would not be immediately absorbed in other sectors would amount to as little as 0.52% of the labour force. According to the World Bank, the size of the total labour force in Tanzania in 2016 was roughly 2.4 million, which means that roughly 12,000 people would be displaced. This does not appear to be a large number for retraining and absorbing in other activities.

Though there have been many initiatives taken by the Tanzanian Tobacco Control forum along with the government and many co-operatives; their reach has been very limited till now. It is important to create awareness amongst farmers by conducting seminars and discussions on the ill effects of tobacco farming. Along with this more case studies are needed on the alternative crops, jobs in the manufacturing sector and the service sector that could provide farmers with better earnings than tobacco. Similarly, though there have been many Child labor eliminating programs, it is important that it is spread to all the villages and not limited to one or two of them. In terms of environmental degradation, also conservation is the need of the hour since so many woodlands are affected for tobacco curing. The government has in the past promoted tobacco growing for their foreign exchange gains, increased employment and better standard of living of farmers. However, the gains from tobacco growing have not trickled down to the poorest sections of the society. Farmers continue to be trapped in poverty. [13]Thus alternatives could actually help alleviate poverty.

[12] Lutgard Kagaruki, 2010 "Alternatives to tobacco: hope for resource poor farmers in Tanzania"
http://blogsofbainbridge.typepad.com/cop4/2010/11/alternatives-to-tobacco-hope-for-resource-poor-farmers-in-tanzania-by-lutgard.html
[13] Asmerom Kidane, John Mduma, Alexis Naho, and Teh-wei Hu, 2016 "Economic returns and comparative costs of farming tobacco, maize, and groundnuts: The case of the Tabora region in Tanzania", African Statistical Journal Journal africain de statistiques Volume 19, 54

4. A Comparative Evaluation of Country Experiences

The ease of switching to viable alternatives depends on several factors apart from Government action, polices and the will to make the switch. There are some common factors that could facilitate the switch. Through a comparative analysis of the tobacco industry and other factors in most of the countries present at this meeting, some key common factors have been identified below.

4.1 Importance of Tobacco in the Economy

While Tobacco may be very important at the sector level in all countries studied here, its importance in the overall context of the economy is generally small. Except in Zimbabwe, where it accounts for a high 24% of the export income, in most cases it is less than 2%.[14] In maximum cases, its contribution to GDP wavers between 1 and 3 per cent, and in employment between 2 and 7 per cent. It is generally a very profitable cash crop and is bolstered by government support in various forms. Interestingly while governments do focus on reducing consumption, there are very few of them, which focus on reducing cultivation of tobacco and manufacturing of cigarettes and cigars.

In Latin America, Brazil has been the highest exporter of Tobacco in the world as well as the second highest producer of Tobacco just after China. Even so, tobacco accounted for only 1.14% of all Brazilian exports, with a shipment value of $2.19 billion in 2015, though its export markets total up to 90 countries. In 2015-2016, due to the "El Nino" effect, there was a decline in production from 595,000 tonnes in the previous year to 460,000 tonnes, though the area cultivated increased to 271,111 hectares from the previous year's 252,000 hectares.[15] The meticulously integrated supply chain makes this crop very profitable accounting for about 16.6% of the total land use and 65% of the tobacco growers' income.[16] Though a fraction of Brazil, Colombia contributed to almost 0.5% of the share of the total volume of tobacco produced in the world. Colombian farmers were looking to increase their tobacco production from 12,923 acres to 17,297 acres by 2016, because of the Free Trade Agreement (FTA) with the US government. According to an estimate by the Colombia's Ministry of Agriculture, this agreement had the potential of bringing an income of almost $25 million by selling 4000 tons of tobacco every year.[17] Mexico by contrast has followed a production reduction strategy without focusing on consumption. According to a WHO Report, the area for tobacco cultivation fell from 16,630

[14] Caroline Claudia Mugadza Khumalo, 2013. "Can Farmers Diversify from Growing Tobacco in Zimbabwe?" Department of Urban and Rural Development Master's Thesis • 30 HEC Rural Development and Natural Resource Management - Master's Programme Uppsala, 22

[15] Afubra- Brazilian Tobacco Growers Association. Available at: Www.afubra.com.br/

[16] Stephanie Rossell, March 2017. "Bouncing Back", Tobacco Reporter. Available at: http://www.tobaccoreporter.com/2017/03/bouncing-back/

[17] Rob Edmond, 2012, "Colombia's tobacco farmers look to increase production in 2013. Available at: https://colombiareports.com/colombias-tobacco-farmers-look-to-increase-production-in-2013/

Ha in 1995 to 6,963 Ha in 2012. This was despite an increase in the crop yield per hectare from 16,477 Hg/Ha in 1995 to 21,880 Hg/Ha in 2012. The report also stated that though there was a fall in tobacco leaf production, the import of tobacco leaf increased[18]. Peru is relatively insignificant in terms of production but its consumption is sizeable.

In Asia, Cambodia's tobacco export is a fraction of Brazil and is grown for domestic consumption and as a part of its import substitution strategy. Its mostly smallholder agriculture and its production has fluctuated considerably over the years.[19] Imports have however shown a considerable decline due to the higher domestic production in Cambodia.[20] Tobacco is grown on 0.25% of total irrigated land in Pakistan. 350,000 workers are employed in the tobacco industry that generates an income of USD$3 bn. As of 2015-16, 35,251 hectares of land was cultivated to grow Flue-cured Virginia, Dark-cured, and white Patta tobacco. Currently, there are 75,000 tobacco growers in Pakistan, out of which 45,000 stay in Khyber Pakhtunkhwa. In 2013-14, the Federal Excise Duty/Sales tax contributed by this sector was nearly USD$900 million. A number of government measures such a minimum support price, subsidised fertilisers and pesticides, as well as extension services support this industry.[21]Tobacco is amongst the top 20 key industries in Myanmar with a market size of US$450 million. Since 2013 it has been growing at a compounded rate of 16%. According to Tobacco Atlas, in 2012, the land devoted to tobacco growing in Myanmar was around 16,500 Ha. It is the highest growing sector in Myanmar even in comparison to apparel (14%) or electronic appliances (15%). [22]

In Africa, Zambia has been a major exporter of tobacco, tea, coffee and maize since the past decade. Tobacco production accounted for almost 0.4% of Zambia's GDP as of 2012, producing a total of 34,000 tons of tobacco valued at 98 million USD. 59,000 hectares of area was used to produce tobacco.[23] In 2016, despite the "El Nino" effect, Zimbabwe sold 202 million kilograms of the crop worth almost $600 million.[24] After China, Brazil and USA, Zimbabwe is one of the highest exporters of Flue-cured tobacco in the world contributing to 24% of its export income. [25] The high profits and a good payment system

[18] WHO and UNCTAD, 2013, "Tobacco Agriculture and Trade- Mexico"; FAO and UN Comtrade

[19] BDLINK (CAMBODIA) Co. LTD. 2015. "AGRICULTURE AND AGRO-PROCESSING SECTOR IN CAMBODIA", Taking Stock: A detailed review of current challenges and investment opportunities in Cambodia, 47; Source: MAFF Annual Report 2011-16

[20] Ministry of Economy and Finance, Cambodia. August 2016. "CAMBODIA MACROECONOMIC MONITOR MID-YEAR ASSESSMENT 2016"; 7

[21] Pakistan Tobacco Board- 2016, Available at: www.ptb.gov.pk/

[22] Mary Assunta, SEATCA, Jan 2017. "Myanmar needs to stub out growing tobacco usage", Available at: http://www.eastasiaforum.org/2017/01/07/myanmar-needs-to-stub-out-growing-tobacco-usage/

[23] Goma, F, J Drope, R Zulu, Q Li, G Chelwa, J Banda; 2015; "The Economics of Tobacco Farming in Zambia", Lusaka: University of Zambia School of Medicine and Atlanta: American Cancer Society, 2, 3. Source: Food and Agriculture Organization, FAO Statistics Database, 2015, World Development Indicators Database, 2015.

[24] Elita Chikwati, Dec 2016 "Agri Season Hectic", The Herald, Zimbabwe, Available at: https://www.pressreader.com/zimbabwe/the-herald-zimbabwe/20161229/281509340851395

[25] Caroline Claudia Mugadza Khumalo, 2013, "Can Farmers Diversify from Growing Tobacco in Zimbabwe?" Department of Urban and Rural Development Master's Thesis • 30 HEC Rural Development and Natural Resource Management - Master's Programme Uppsala ,17. Source: Rubert,S., 1998. "A Most Promising Weed". USA: Centre for International Studies, Ohio University, 3

are incentive enough for the farmers to produce tobacco in Zimbabwe, unlike other crops such as maize and cotton which require long waiting periods for payment. Besides being paid in USD, earnings in tobacco were really high: maize earned US$650/t in 5t/ha, whereas tobacco yielded US$2000/t on more than 1t/ha.[26]

To sum up except in the case of Zimbabwe, tobacco and its products is a small share of export earnings in almost all countries covered by this paper. While its profitability is high, part of this is due to government support. Of particular importance is the imputed value of the land cost, which if included would decrease the profitability of tobacco vis a vis other crops. In terms of its share of GDP, the contribution of tobacco is minimal. It is also to be noted as stated below; smallholder tobacco growers as well as contract farmers are constantly caught in a cycle of debt and poverty. This implies that the distribution of profits is totally uneven between the farmers and the companies.

4.2 Social, health and environmental effects of growing tobacco

It is important to protect farmers from the harmful effects of tobacco growing and provide them with viable alternatives for a sustainable future. For example in Brazil, child labour and cycles of debt and poverty are common in the tobacco sector. The integrated supply chain promotes asymmetric bargaining power in the market and increased dependence of workers on tobacco growing. [27] Tobacco growing also has proven to have harmful effects on the health of the farmers. The close proximity to nicotine and other chemicals due to long working hours has resulted in hazardous diseases such as "Green Tobacco Sickness". [28] Apart from these effects, which were observed in all countries, Cambodia also saw large-scale deforestation, land pollution and soil erosion. 36% of its contracted farmers showed signs of the "Green Tobacco Sickness" as compared to the 14% non-contracted ones. This was also due to the limited knowledge farmers have in handling pesticides and other chemicals. [29] The farmer was always trapped in the vicious cycle of debt and loans from tobacco companies.[30] Being a

[26] Caroline Claudia Mugadza Khumalo, 2013, "Can Farmers Diversify from Growing Tobacco in Zimbabwe?", Department of Urban and Rural Development Master's Thesis • 30 HEC Rural Development and Natural Resource Management - Master's Programme Uppsala, 40
[27] Marco Antonio Vargas and Renato Ramos Campos, 2005. "HNP Discussion Paper, Economics of Tobacco control Paper 28- Crop Substitution and Diversification Strategies: Empirical Evidence from Selected Brazilian Municipalities", 9
[28] Tobacco Atlas- Brazil, 2016. Available at: http://www.tobaccoatlas.org/country-data/brazil/
[29] Dr Poch Bunnak, Dr Mom Kong and Dr Yel Daravuth, 2009. "Southeast Asia Tobacco Control Alliance (SEATCA) The Study on Tobacco Farming", Under The Tobacco Control Research Program; Supported by: The Rockefeller Foundation & The Thai Health Promotion Foundation (ThaiHealth)

[30] SEATCA. September 2008. "CYCLE OF POVERTY IN TOBACCO FARMING TOBACCO CULTIVATION IN SOUTHEAST ASIA", 13. Source: Survey on Tobacco Farming in Cambodia; PATH Canada and Work for a Better Bangladesh

labor-intensive activity, tobacco production also involves children, depriving them of opportunities of health and education.[31]

Tobacco growing in Mexico led to many ill effects such as deterioration in health of the farmers, torture by the tobacco leaf companies and child labor. In a study of 171 migrant working children in Nayarit state, Mexico, it was observed that 56 children (33%) of the children were exposed to harmful chemicals and pesticides.[32] In Zambia, contract farmers were pushed further into poverty. The leaf producing companies' dictated low prices of the crop as well as the high interest rates for the loans offered to the farmers. Child labor was also highly prevalent in Zambia, with children working as "unpaid workers" in the fields. This thus, robbed the child of basic education as well as exposed the family members to hazardous diseases such as "Green Tobacco Sickness". They were also forced to store the tobacco leaves in their houses due to extreme poverty and this contributed further to their ill health.[33] In Zimbabwe, children are vulnerable to dseases due to the exposure to pesticides, such as ethylene dibromide, while weeding and harvesting tobacco.[34] Farmers do not get a fair and just contract nor are they supplied with any inputs for production of tobacco. This leads to lower output and lower prices that pushes them further into poverty and debt.[35] Tobacco also leads to soil erosion and loss of productivity due to deforestation and the use of chemicals.

To sum up, tobacco growing has environmental effects, it generates diseases especially green tobacco sickness exposes children to harmful chemicals and even leaches the soil. Cultivating alternative crops may reduce if not eliminate these issues. It is important to factor in these issues while calculating the cost and profitability of tobacco. It is also important for governments to think ahead and prevent first of all an expansion of this industry, and also investigate other crops, which would be equally profitable and less harmful to health, environment, and income distribution.

4.3 Crop Substitution

Tobacco growing farmers need to diversify into other crops and reduce reliance on only one crop for their livelihood. A case study in Schroeder, South of Brazil, showed that tobacco growing was replaced

[31] Dr.Rene Espino, Dr.Mary Assunta and Dr.Foong Kin; Contributors: Dr.Kong Mom, Mr.Abdillah Ahsan, Ms.Jennie Lyn Reyes, Ms.Tan Yen Lian, Dr.Nuntavarn Vichit-Vadakan, Dr.Uma Langkulse, Ms.Le Thi Thu and Dr.Ulysses Dorotheo, Southeast Asia Tobacco Control Alliance (SEATCA), March 2013- *"TOBACCO FARMING IN THE ASEAN REGION"*,5

[32] Marty Otañez; 2008; "Social disruption caused by tobacco growing"; 13. Source: Gamlin J, Hesketh T. "Child work in agriculture: acute and chronic health hazards. Children, Youth and Environments" 2007;17(4):1-23.

[33] Brenda Chitindi. "UNFAIR CONTRACTS AND MISERY IN ZAMBIA'S TOBACCO FARMS". Tobacco-free Association of Zambia in FARMERS AND OTHER VICTIMS OF TOBACCO; 4, Available at
: file:///Users/Aniyarijain/Downloads/Pull%20Out%20Delhi%20Day%204_WEB%20(7).pdf

[34] Center for Tobacco Control, "Factsheet on Alternative livelihoods to Tobacco Farming in Africa", 3, Available at: http://ctc-africa.org/images/docments/factsheets/ALFACTSHEET.pdf

[35] Moses Moyo, December 2014. "Effectiveness of a contract farming arrangement: A case study of tobacco farmers in Mazowe district in Zimbabwe", 52, Available at: http://www.fao.org/uploads/media/moyo_effectiveness_%20%202014.pdf

by bananas cultivation that yielded a higher profit. Another study from Brazil of the farmers in the three cities namely Rio Grande do Sul, Santa Catarina, Paraná le, found that cost of production of crops such as beans, corn, vegetables etc was five times less than tobacco.[36]If 15% of cost of land were added, the tobacco production cost would increase significantly thus making substitutes even more competitive.[37] In Cambodia, farmers cultivate rice, vegetables, soyabean, sweet potato etc, as tobacco is cultivated only in the dry season. They also raise poultry, fisheries or work in cities for their daily livelihood. Thus, they are not entirely dependent on tobacco production. It was observed that from 1997 to 2008, the land for farming rubber, soyabean etc. had increased, while for tobacco had decreased by almost 50%. This was due to lower profitability of tobacco, contract farming manipulation, excessive capital requirement and price volatility.[38]

In Myanmar, crop diversification was likely to favour crops such as oilseeds and soybean if proper processing facilities were available. Tree crops had the advantage of benefiting from low density of population and land availability in Myanmar. Horticultural crops could generate high incomes because of increased domestic demand. These crops also could be exported to countries where labour costs were higher. Myanmar also has a comparative advantage for rice as compared to other countries such as Thailand and Indonesia with an average yield of 4.1 tonnes/ha.[39]

In Colombia, currently cocoa is seen as a very good alternative to illicit crops such as tobacco or even drugs. With government assistance from Ministry of Agriculture and Rural Development (MADR), planned initiatives and technical assistance to increase productivity; the acreage under cocoa increased from 96,000ha in 2005 to 152,000 in 2014.[40] In 2014, cocoa producers adopted an aggressive strategy to capitalize on the economic prospects by increasing plantations by another 80,000 hectares.[41] Apart from cocoa, the MADR promoted other agricultural products such as milk, flowers and Panela to boost their productivity. PROCOLOMBIA (Former PROEXPORT) is a part of the MADR and

[36] Marco Antonio Vargas and Renato Ramos Campos. 2005. "HNP Discussion Paper, Economics of Tobacco control Paper 28- Crop Substitution and Diversification Strategies: Empirical Evidence from Selected Brazilian Municipalities", *11*

[37] Marco Antonio Vargas and Renato Ramos Campos. 2005. "HNP Discussion Paper, Economics of Tobacco control Paper 28- Crop Substitution and Diversification Strategies: Empirical Evidence from Selected Brazilian Municipalities", *11* Source: Leonardo Xavier Silva. (2002). Análise do complexo agroindustrial fumageiro sul-brasileiro sob o enfoque da economia dos custos de transação. Porto Alegre: UFRGS/PPGE (phD thesis)

[38] Dr Poch Bunnak, Dr Mom Kong and Dr Yel Daravuth, 2009. *Southeast Asia Tobacco Control Alliance (SEATCA) The Study on Tobacco Farming,* Under The Tobacco Control Research Program; Supported by: The Rockefeller Foundation & The Thai Health Promotion Foundation (ThaiHealth)

[39] GOVERNMENT OF THE REPUBLIC OF THE UNION OF MYANMAR; 2016; "MYANMAR: National Action Plan for Agriculture (NAPA) Working Paper 1: Crop production, extension and applied research" *8,73*

[40] OECD Review of Agricultural Policies, Colombia; 2015; 157

[41] Vladimir Pekic, 2014. "Premium Chocolatiers take note: Columbia to renew high quality cocoa plantations", Available at: http://www.confectionerynews.com/Commodities/Colombia-plans-to-replant-high-quality-Fino-de-Aroma-cocoa

it also helps in promoting the marketing and exports of these agricultural crops.[42] In Peru an important substitute of tobacco is Quinoa.[43]

The Ministry of Health in Mexico along with the Ministry of Agriculture (SAGARPA- Secretariat of Agriculture etc.) initiated the research for alternatives to tobacco growing in the states of Nayarit and Veracruz. Instead of merely replacing tobacco with a crop, they wanted to develop a strategy for the smooth transition of the farmers to other crops. Crops such as tomato, green chili pepper, papaya, corn, beans, sorghum, rice and many more were analysed for diversification. [44] Nayarit and Veracruz were identified for crop substitution for government programs such as PROCAMPO, as these provinces accounted for over 80% of the tobacco production in the country. Between 2005 and 2012, Nayarit received support of USD 572.5 million for crop diversification away from tobacco. Out of this 67% was received from the PROCAMPO program, while 17.4% was given for improving farm drainage and for irrigation facilities; 12.3% for introducing modernized irrigation methods and 3.3% was aimed to protect the agricultural sector. Nayarit showed a crop reconversion of almost 23,900 Ha of land. Thus, tobacco-cultivated land was reconverted to crops such as beans, lemon, avocado, corn, rice and fruit. A comparative study of the profitability of these crops showed that after the support of the program, Beans, Mango, Papaya, Sorghum showed highest profitability per hectare as compared to tobacco. In Veracruz as well, with the help of the support from the PROCAMPO programs etc., from 2005-2006, the area for growing tobacco was reconverted into beans and green house tomatoes. This was hailed as a positive step in the direction of viable alternatives to tobacco growing; however the impact of the study was limited only to one or two cities.[45]

Pakistan has very little available literature on substitution crops. However, looking at the recent trends, crops such as sugarcane, maize and rice come close to providing as good a yield per hectare as tobacco.[46] In both Zambia and Zimbabwe, concerted efforts to substitute tobacco have yet to be made. Crops such as bamboo, horticultural products etc. offer viable alternatives but are more expensive to cultivate than tobacco at this point of time.[47]

[42] OECD, 2015, op.cit
[43] Alexander Kasterine, July 2016. "Quinoa isn't a threat to food security. It's improving Peruvian farmers' lives", Available at: https://www.theguardian.com/sustainable-business/2016/jul/17/quinoa-threat-food-security-improving-peruvian-farmers-lives-superfood
[44] Sonjavon Eichborn , Laure Norger (eds). 2012. "Alternative Livelihoods to Tobacco: Approaches and Experiences", 7, 8
[45] Mr. Jose Aviña and Mr. Rodrigo Vidal, Mexico SAGARPA, 2012. "CROP RECONVERSION OF TOBACCO IN MEXICO", 4,8,9,11,12,13
[46] Government of Finance, Pakistan. 2016. "Agriculture By Pakistan", 27, 28, 29; Source: Pakistan Bureau of Statistics 2011-16
[47] Bruce Gemmill, May 2014. "Bamboo a viable alternative to tobacco", Zimbabwe Independent, Available at: https://www.theindependent.co.zw/2014/05/09/bamboo-viable-alternative-tobacco/

4.4 Government and other Support for Diversification away from Tobacco

While both NGO and government schemes for diversification started as early as 2000 in Brazil, as was shown above the acreage under tobacco only increased in 2016. Centro de Apoio ao Pequeno Agricultor (CAPA) a non-governmental organization promoted an initiative called "ECOVALE" in 2000, to not only encourage alternative crop production, but also its marketing. Crops such as Brazilian tea, vegetables and rice in Santa Cruz do Sul, Vera Cruz, Vale do Sol and Venâncio Aires were marketed through fairs. CAPA also established "ECOVIDA", an organic certification scheme to certify the market and quality of the products.[48]. After ratifying the FCTC in 2005, Brazil initiated the National Diversification Program in Tobacco Growing Areas to reduce single crop reliance. Training and financial assistance in poultry farming, aquaculture, beekeeping and dairy farming was also provided. By 2012, this program had invested US$25 million into 75 projects for promoting training, research, financial assistance etc. to 45,000 families in 600 municipalities. In 2008, a Thematic Network on Diversification in Tobacco growing areas was established to take up the diversification program in municipalities. One such municipality was Dom Feliciano/RS. Here, they provided alternatives to tobacco growing by demonstrating poultry farming, cultivation of grapes and wines etc. Secondly, they also provided health care information, technical assistance and also made people aware on the ill effects of tobacco farming. They also hold fairs and exhibitions to promote outreach of the program to all the villages and small towns and publish research work on diversification opportunities to tobacco growing.[49]

In Cambodia, the government and Ministry of Agriculture, Forestry and Fisheries (MAFF) saw land reform program as key to crop diversification. Thus, MAFF granted Economic Land Concessions to the farmers to cultivate crops such as cassava, palm oil, sugar cane etc.[50] Also, in 2006, prominent business leaders, NGOs and the government created the Cambodia Organic Agriculture Association (COrAA) with an aim to provide alternatives to farmers in organic farming as well as certify the organic products in the local market, something that was not practiced before.[51] Despite these initiatives land under tobacco has grown because of its import substitution strategy. Between 2009 and 2013, MAFF initiated

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[48] Sonjavon Eichborn , Laure Norger (eds). 2012. "Alternative Livelihoods to Tobacco: Approaches and Experiences", 7,12,17,18,19,20, 21, 22,43, Sources: IECLB; CAPA (2004): CAPA em defesa da vida. Jorev Luterano, Encarte Especial. Vargas, Marco A; Campos, Renato R. (2005): Crop Substitution and Diversification Strategies: Empirical Evidence from Selected Brazilian Municipalities. Economies of Tobacco Control Paper No. 28. HNP Discussion Paper (Worldbank). Washington DC, pp.15-18. Rita Surita, personal communication, 22 Mar 2012. STR Cruzeiro do Sul (2011): ECOVALE completa dez anos. http://strcruzeirodosul.blogspot.de/2010/08/agosto-de-2010- ecovale-completa- dez.html and CAPA: Produtos. http://www.capa.org.br/site/content/produtos/index.php (Santa Cruz). CAPA (2005): Agroecologia. A prática no CAPA. Porto Alegre, p. 17. http://www.capa.org.br/uploads/publicacoes/ Caderno_sobre_Agroecologia.pdf
Souza Cruz: Sustainable agriculture and environment. http://www.souzacruz.com.br/group/sites/SOU_7YKDBY.nsf/ vwPagesWebLive/DO7V9P7F?opendocument&SKN=1
[49] Ibid
[50] Ministry of Agriculture, Forestry and Fisheries, May 2015. "Agricultural Sector Strategic Development Plan 2014-2018", 9
[51] BDLINK (CAMBODIA) Co. LTD. 2015. "AGRICULTURE AND AGRO-PROCESSING SECTOR IN CAMBODIA Taking Stock: A detailed review of current challenges and investment opportunities in Cambodia", 39. Source: Cambodian Organic Agriculture Association (COrAA). 2011. Pesticidal Plants in Cambodia, 5th Edition. Phnom Penh: Cambodian Organic Agriculture Association. Available at: http://www.coraa.org/userfiles/file/Book_Pesticidal%20Plants%20in%20Cambodia%20info%20web.pdf [26 April 2016]

the "Agricultural Extension Services" through 556 agricultural co-operative organizations. The extension service workers provided training to farmers in crop selection, marketing, business development, finance, land and soil practices and so on. Given the success of this initiative, the government has decided to increase awareness even at local levels.[52] Colombia has limited schemes available in terms of the alternatives to tobacco growing for their farmers. To the contrary land under cultivation has been expanding especially after the FTA with the USA.[53]

Mexico is the only country that has reduced its acreage under tobacco by almost two and a half time. Apart from crop diversification, the government launched the *Sectoral Programme for Agricultural, Fisheries and Food Development 2013–2018*. The specific target under this scheme was to bolster domestic production for the main food grains and oil seeds, such as rice, dry beans, corn, wheat and sorghum by 2018. The intention was to optimally utilize the full potential of the Mexico food sector and achieve the GDP potential of over 3% for the agricultural and fisheries sector. The so*cial Sector Development Programme 2013-2018* was also initiated to provide the right to social security specifically to the underprivileged in Mexico.[54] Since 2010, the government has a special allocation fund that is dedicated in the budget for converting tobacco-cultivated areas into other sustainable crops cultivation.[55]

Peru has used different agricultural programmes to encourage the production of crops. In 2015, it was announced that 253,000 ha of new irrigated agricultural land would be added in Peru. Under this scheme, infrastructure projects such as canals, dams would optimally use water resources for benefiting 71,000 rural families and improving land productivity for the farmers. In 2014, the government funded 46 projects adding 6700 ha of irrigated land.[56] Peru's agriculture-for-export model, MINAGRI (Ministry of Agriculture) and Ministry of Production (PRODUCE) supported Sierra Exportadora to increase the company sales of jungle crops such as cranberry juice and cheeses to almost $200 m in 2014. In 2015, the *"National Agrarian Innovation Programme"* provided companies with 80% of the research and innovation cost for developing genetically modified crops suited for Peru weather conditions[57]. *Programa Nacional de Innovación Agraria (PNIA)* aimed to increase training of farmers, provide extension services to them, research and proper marketing channels for increasing their crop productivity and promote agricultural innovation. Another program identified was *the*

[52] Ministry of Agriculture, Forestry and Fisheries, May 2015, op.cit, 8
[53] OECD Review of Agricultural Policies, Colombia; 2015; 167
[54] FAO, 2016. "COUNTRY FACT SHEET ON FOOD AND AGRICULTURE POLICY TRENDS"; 3, 4; Source:
http://gain.fas.usda.gov/Recent%20GAIN%20Publications/PROCAMPO%202013%20Subsidy%20Program%20Changes_Mexico_Mexico_2-14-2013.pdf.
[55] Sonjavon Eichborn , Laure Norger (eds). 2012. "Alternative Livelihoods to Tobacco: Approaches and Experiences". 7,8
[56] Maura Maxwell, April 2015. "Irrigation schemes boost Peru's agricultural output", Available at:
http://www.fruitnet.com/americafruit/article/164976/irrigation-schemes-boost-perus-agricultural-output
[57] Oxford Business Group, 2016. "Agricultural exports on the rise in Peru", Available at:
http://www.oxfordbusinessgroup.com/overview/fresh-horizons-agricultural-exports-are-taking-place-traditional-foreign-currency-earners

Programa Subsectorial de Irrigaciones (PSI) (The Subsector Irrigation Program), which contributed to providing higher profitability and productivity of crops in the highlands through modernization of irrigation systems. *InnóvatePerú* was The National Innovation Program for Competitiveness and Productivity, which was a part of the National Product Diversification Plan.[58] While these programs did not directly target tobacco reduction, by encouraging other crops they may have indirectly done so.

In 2016, the Ministry of Agriculture, Zambia initiated the e-voucher pilot (E-FISP) in 13 districts with 241,000 smallholder farmers to promote agricultural diversification. In this, the farmers were provided with specific inputs according to their needs and requirement. It also provided a fair and good platform for selling inputs to the farmers and protected them from the unfair trade practices by the agro-dealers. Given its success in 13 districts, the MOA plans to now expand it to 39 districts. In 2015/2016, it was reported that 25% E- Vouchers were distributed, 85% were used for purchasing fertilizer and maize seeds. This was hailed as a good way to promote multi-crop cultivation and reduce reliance on just one crop for sustaining livelihood. In specific terms of tobacco growing, this effort is likely to benefit the farmers, as it would protect them from price manipulation by the tobacco companies and also provide them with inputs to grow other crops.[59]The Tobacco Free Association of Zambia (TOFAZA) has previously collaborated with MOA and private and public sector enterprises to provide research, data analysis, information and awareness about alternatives. Since 2012, they have spread awareness in Lusaka (George, Chawama and Kabanana compounds; Katuba Rural Community, Lilanda), Eastern Province (Chipata district), Southern Province (Kalomo district), and Central Province (Kabwe district). Though, these initiatives do not directly target the issue of tobacco cultivation, indirectly, they are promoting awareness to stop tobacco cutivation. However, their reach is limited and these organizations should initiate more research- based campaigns, eco-logical fairs to inform farmers on good agricultural practices. Despite these intiatives, an interview of a tobacco growing farmer in Chipata village showed a lack of knowledge on alternative crops as nothing could compete with the income potential of tobacco. For him his livelihood depended on tobacco growing. [60]In the past, FCTC delegates had suggested a shift to alternative crops such as paprika and yams, but due to lower income potential Zambian farmers have dismissed these alternatives. Hence, the government found it difficult to pass tobacco control legislations. Tobacco lobbies have also organized workers to challenge and undermine the efforts of tobacco control committees in Zambia.[61]

[58] Michael Peperkamp, 2016. "Factfinding Horticulture Peru", Assigned by Royal Dutch Embassy in Lima; 17,18

[59] Antony Chapoto and Brian Chisanga, 2016. "Zambia Agriculture Status Report"; Indaba Agricultural Policy Research Institute Lusaka, Zambia; II, 17, 18, 19 Source: Kuteya, N. A., Lukama, C., Chapoto, A., and Malata,V. 2016. "Lessons Learnt from the Implementation of the E-voucher Pilot". Indaba Agricultural Policy Research Institute. Policy Brief No. 81; Lusaka, Zambia: IAPRI.

[60] Drew Johnson, November 2016. "UN Efforts To Reduce Tobacco Cultivation Strikes Fear In Zambian Farmers", Available at: http://dailycaller.com/2016/11/11/un-efforts-to-reduce-tobacco-cultivation-strikes-fear-in-zambian-farmers/

[61] John Stewart, 2014. "Tobacco Control Bill: The Challenge before Nigerian lawmakers", Available at: http://www.premiumtimesng.com/opinion/153288-tobacco-control-bill-challenge-nrigerian-lawmakers-john-stewart.html

Zimbabwe supported two schemes, which may have helped farmers move out of tobacco. The Presidential Inputs Support Scheme provided maize seeds and fertilizers, and other grain seeds to the farmers. The main purpose of this scheme by the government was to ensure food security in rural areas. In 2016 it benefited 800,000 households in Zimbabwe. Though, this directly did not target tobacco growers, ready input supply and timely payment for cultivating alternatives such as maize and other crops may give them an incentive to shift. The second was Command Agriculture where the government promoted growing of maize to reduce reliance on imports. Though this directly did not shift production away from tobacco cultivation, it helped to provide diversification opportunities to the farmers. Around 33,931 farmers were contracted under this scheme and received 76% of maize seeds for production, leading to an additional 135,000 Ha of land under maize. However, despite these efforts timely inputs for maize production was not always available. In 2015, the Ministry of Finance and Economic Development imposed a levy of 1.5% on the farmers on the selling price of tobacco. This was done with an aim to finance conservation projects and create awareness for reforestation. However, there was a lot of unrest amongst the farmers who wanted to be reimbursed for the $14 million that went from their pocket in the form of a charge. Hence, the government in 2016 reduced the levy to 0.75% of the retail price.[62] Thus, government efforts at curbing tobacco production were relatively short lived.

4.5 Summing Up

What did Mexico get right which the other countries could not? Firstly, Mexico sustained its alternative crop strategy for over twenty years. It put a lot of resources on alternatives and consciously promoted the switching to alternative crops in a sustained manner. It included comprehensive packages that made alternative crops more profitable by promoting innovation, training, providing support to the farmers during the transition phase and lastly making tobacco production less profitable by providing incentives to switch. This experience has to be contrasted with Brazil, which developed a lot of programs for alternative crops but did not provide any incentives for crop switching. Hence, acreage under tobacco actually increased.

Country experiences also showed that policy coherence is important. For example, Cambodia provided incentives to alternatives but promoted tobacco cultivation at the same time as part of its import substitution policy. Similarly, Zimbabwe provided a lot of incentives to maize and even made it profitable, but had to scale down its tobacco levy. Zambia's e-voucher initiative would have been very successful at promoting diversification were it not undermined by the tobacco lobbies. Colombia's

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[62] Elita Chikwati, Dec 2016 "Agri Season Hectic", The Herald, Zimbabwe, Available at: https://www.pressreader.com/zimbabwe/the-herald-zimbabwe/20161229/281509340851395

efforts at tobacco control got undone by its FTA with the USA, wherein its efforts were directed to expand tobacco exports to the USA.

5. Conclusions and Way Forward

This paper has shown that the FCTC's efforts at controlling prevalence is unlikely to have significant effects on GDP, employment, wages, exports and emissions. Specifically, the economic contribution of tobacco to jobs and incomes, foreign exchange, derived by exports and imports, needs to be examined. What these effects will be will vary from country to country. A systematic approach to examining these effects would be through modelling approaches, using both PE and CGE. While all results of models have to be juxtaposed with the realities of an economy, it is a useful starting point. The CGE model, which provides a holistic picture, also throws up alternatives to tobacco that could counter the negative economic effects of a reduction in tobacco production.

Specifically, using PE and CGE models, this paper showed that Tanzania would see minimum displacement of labour as a result of 30% reduction in tobacco prevalence. In fact only about 12,000 people would be displaced in net terms. In addition, the potential for export earnings from forestry products alone would more than compensate for the losses of foreign exchange due to tobacco exports. The other tangible benefits would include reduced child labour, reduction of green tobacco sickness, diversification of the economy as well as improvement in the long term productivity of the economy. Would the result be different for other countries?

The bottom line is that there are farmers who would be affected if global and/or national demand of tobacco were to fall. However, as the country studies show above, in very few cases is tobacco very significant in GDP, Exports or Employment. Besides there are many other commodities whose prices have been volatile due to global demand and supply trends and there is no reason to treat tobacco as a special case. In most countries the land allocated to tobacco is no more than 1.5%, hence tobacco is not important in a macro sense. However, if profitability of tobacco is higher than other crops, first markets distortions such as subsidies ought to be removed. Secondly, countries may need to provide incentives to switch to other activities in agriculture, manufacturing and services.

A fall in tobacco consumption that leads cigarette manufacturers, retailers and distributors to cut some jobs does not necessarily cause a fall in total employment. Money no longer spent on cigarettes will be spent instead on other goods and services, generating new jobs to replace those lost from the tobacco industry. In fact, depending on the new pattern of consumption, more jobs could be created than lost. Although tobacco growing is labor-intensive; cigarette manufacturing is increasingly capital intensive, even in developing countries. This is to the extent that the things that consumers buy instead of cigarettes are more labor-intensive. This would ultimately have a positive net effect on employment. As shown in the case of Tanzania, the net effect on employment was a meagre 0.52%.

As far as export revenues are concerned, many countries have a net trade deficit from tobacco and tobacco products – more is spent on imports than the revenues from exports. In these countries, there would be foreign exchange savings if national consumption (and hence imports) fell, and a generally small impact if global demand fell and affected their exports. There are few developing countries that are net exporters of cigarettes (Bolivia, Venezuela, Croatia and Hungary), and in no cases are cigarettes an important source of export revenues. The developing countries with a positive tobacco leaf trade balance (net exporters) have more to lose from a fall in global demand, although much will depend on how competitive their tobacco leaf exports are. Falling global tobacco prices could squeeze higher-price producers out, and increase the market share of lower-price producers, although profit margins might be lower. The impact on particular countries is not easy to predict, though modelling would provide some insights. It should also be noted that even in the major growing countries, tobacco leaf exports make a modest contribution to total export revenues, hence they are easily replaceable by alternatives.

While the search for alternatives can begin with a modelling exercise, it has to be juxtaposed with the existing conditions of the economies themselves. While the literature is replete with alternative crops from every country studied here, there is relatively little evidence on how manufacturing and services jobs could replace agricultural jobs displaced from the tobacco sector. Migration studies indicate that displaced agricultural labour generally goes to low skill services in the urban areas. This is where government intervention in terms of training displaced labour to find higher paid jobs would be particularly useful.

The experience of the countries studied here shows that almost all countries have developed policies to either direct resources to alternative crops or indirectly promote agriculture as a whole. However except for Mexico, in most cases the land under tobacco cultivation has actually increased. In some cases, the increase is marginal, while in others it is substantive. However, in Mexico imports have increased and so consumption has not gone down defeating the purpose of reducing prevalence. An interesting country is Myanmar which is planning to increase tobacco production, and where alternatives do not seem promising. It would be important to examine through a modelling exercise whether alternatives such as gems and jewellery could be developed to provide better income earning opportunities. At this stage when the tobacco sector in Myanmar is not fully developed encouraging a switch to alternatives would be useful.

Way forward

1. Policy makers have to be convinced that the reduction in prevalence will not have an irremediable adverse effect on the economy. For this purpose modelling approaches could be used.

2. Alternatives thrown up by economic models need to be juxtaposed against the realities of the economies.

3. Transition costs need to be managed as they will undoubtedly arise.

4. Government policies and support, as well as international support would be required to transition to alternatives to tobacco.

5. Policy coherence is an important aspect and governments need to be cognizant of this in their approach to prevalence reduction.

Annex 1

Approach with more complicated behavioural parameters

The objective of our analysis proposed is to identify the extent to which a policy-induced (FCTC) reduction in prevalence of tobacco consumption gets translated into reduction in trade, production and employment of tobacco farmers. In this document, we outline the simulation model developed for this purpose.

PE Model for Measuring Economic Impact of FCTC Policies: Some Refinements

Firstly, we define prevalence as a policy variable that is shocked from outside the model (exogenous). We assume the percentage reduction in prevalence derived from other studies and models such as SIMSMOKE and inputs from WHO staff members. Thus, we assume the shock as 30% relative reduction in tobacco prevalence between 2010 and 2025 as per the FCTC COP global target. This is defined in the ratio of people who consume tobacco and its products to the total population in a given country. Moreover, tobacco consumption here refers mainly to consumption of cigarettes and cigars. Since around 75% of tobacco leaves grown globally are used for cigarettes.[63]

Secondly, we derive tobacco consumption from prevalence, by multiplying the latter with average per-capita consumption of tobacco and population.

Thus, when prevalence decreases and population increases, the tobacco consumption can change towards any direction, depending on whether prevalence or population changes the most. Until this part, there is no behavioral parameter involved and the model is plain algebra, as follows:

Tobacco Consumption = Prevalence * Population * Per-capita Tobacco Consumption

When we linearize the equation above, the right hand side gets translated into the sum of percentage changes in prevalence, population and per-capita tobacco consumption.

ΔTobacco Consumption = ΔPrevalence + ΔPopulation + ΔPer-capita Tobacco Consumption –(1)

The former two of these are policy/projection variables, while one is derived from the model. Changes in prevalence is a policy variable. While adult population (15+) change is based on demographic and macro-economic projections derived from United Nations, World Population Prospects (2015) The rationale for such a specification (as against directly working with aggregate consumption as a model variable) is that the governments set prevalence reduction targets.

Throughout this document from equation (2), unless otherwise specified (typically as Initial Levels), all variables starting with the symbol Δ (and not elasticity's) are in percentage changes form.

Per-capita tobacco consumption (in percent changes, named ConsPC) is derived from a simple demand equation with income (ELASTY) and price elasticities (ELASTP), depending on consumption prices (PricesCons), as follows:

ΔConsPC = ELASTY * (Δincome – Δpopulation) – ELASTP * ΔPricesCons --(2)

The reason why we subtract population growth rate from income (GDP) growth rate is that per-capita consumption depends on per-capita income and not aggregate income; to calculate growth in per-

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[63] Anne- Marie Perucic, 2012, 0-.cit.

capita income, we need to subtract population growth from income growth, as we do here.

$$\Delta Domcons = ((Initial\ Total\ Consumption)* \Delta Total\ Consumption - (Initial\ Imports) * \Delta Imports)/ (Initial\ domestic\ consumption) \quad --(3)$$

Percent change in imports in the equation above is determined by a simple import demand equation featuring Armington-type domestic-import substitution, as follows, where Pimports denotes the prices of imports and ELASTPImports is the elasticity of substitution between imports and domestic products:

$$\Delta imports = \Delta TotalConsumption - ELASTPImports *(\Delta PricesCons - \Delta Pimports) \quad --(4)$$

Percent change in production is derived as the weighted changes in exports and domestic consumption derived from equation (3). The weights ensure that the effects of domestic consumption (DomCons) and exports on output are consistent with the initial structure. For example, the higher the share of domestic consumption in production, the higher is the impact of changes in domestic consumption on production.

$$\Delta production = ((Initial\ domestic\ consumption)* \Delta DomCons + (Initial\ Exports)* \Delta exports) / (Initial\ Production) \quad --(5)$$

Export supply function is similar to the import demand function, with two broad terms: the first one capturing production expansion effect and the second one capturing the substitution between domestic consumption and exports; the prices included in this equation are production prices (pprod) and export prices (pexports).

$$\Delta exports = \Delta production - ELASTPExports * (\Delta pprod - \Delta pexports) \quad --(6)$$

In both export and import changes (equations 4 and 6), the second term is effective only when the price differentials are non-zero. In our analysis, all the price changes are identical, given that tax changes are the only differences, and we assume them to be zero. Thus, for example, percentage changes in exports are the same as those in production; those in imports are the same as those in consumption. The elasticities in equations (4) and (6) have been calculated from the data from UN commodity statistics for the period between years 2000 and 2010.

Employment multiplier was calculated from the data in ILA(2011) that included employment and production for several years. This was calculated by dividing the percent change in employment by percent change in output. We found that for every 1% increase in production of tobacco products and raw tobacco, 1.1% more jobs are created, on an average. Thus, we find the percent change in employment by multiplying the result from (5) by this employment multiplier 1.1.

There are some limitations to the current treatment of employment in this model. Firstly, we are ignoring the wage effects, assuming that the employment multiplier effects are more important than them. This is partly because of the difficulties in collecting wages data and partly because this may give rise to disconnect between output and employment, which is more important for the model than the labor market interactions arising from changes in wages. Secondly, we do not account for Input-Output (IO) linkages between tobacco and other sectors in this model. This may lead to two extreme possibilities: first, given that a lot bigger (negative) adjustment can happen in the tobacco sector since the farmers will be free to move to other sectors, an IO- based model would probably show a more negative effect on employment; second, given that the overall employment in other sectors is likely to increase due to the land freed from tobacco cultivation, one may observe a much higher increase in overall employment in the economy in an IO-based model. In other words, an IO-based model may show a lower increase in tobacco sector employment and higher increase in overall employment than what may be implied by the current model.

Finally we assume the basic prices as exogenous in this model. This is because we observe an inelastic consumption behavior, so the consumers are predominantly price-takers. We also calculate the overall producer price inflation from the same source and subtract that from the nominal basic prices, to obtain the real basic prices. The idea here is that this trend will continue for the next 15 years.

Model Summary

In summary, employment, exports and imports are derived with assumptions on behavioral response to prices and output. In other words, while the assumptions in (1) are more of accounting identities, we then add, to this model, a system of equations that capture the extent to which production, domestic consumption, imports and exports respond to prices. We assume a standard flexible functional form (CES, Constant Elasticity of Substitution). Since the exogenous shock to prevalence captures the effects of taxes and other aspects that affect tobacco prevalence, we do not allow shocking taxes or tariffs for our current analysis, instead we leave them for future use and extension, possibly in tandem with the Taxsim model.

Here is a list of major features of the elasticity-based part of the model:

a.   Adjustment of farm employment with respect to tobacco output

b.   Consumption demand function for aggregate demand for tobacco products in the country

c.   Similar demand function for imports

d.   Supply function for exports

e.   Basic prices are exogenous, while other prices are derived from them through taxes/tariffs

Let us assume, for illustration, that the reduction in prevalence results in reduced consumption, despite a rise in population. Depending on the share of domestic consumption in total production, production will also fall accordingly. To the extent of the employment elasticity with respect to output, employment may also fall. On the other hand, exports may also fall to the tune of output.

Depending on the inter-play between these features and elasticities, production and employment may or not decrease when prevalence goes down. Data will play the most important role here, although the assumptions on model structure and parameters are also crucial to an extent. For example, if initial exports are zero, then simulated exports will also be zero no matter how big the demand reduction is (this assumption may be changed if needed). The sensitivity of results to alternative parameters can be easily tested. Elasticities are based on estimated parameters in the literature.

Additionally, in this model, we treat raw tobacco and tobacco products separately by introducing a Leontief assumption, meaning that for a given increase 'x%' in exports, imports and production of tobacco products, raw tobacco exports, imports and production also change to the same extent – x%. This is because tobacco is an essential ingredient of tobacco product, and cannot be substituted with other inputs like labor.

Use of this model:

Initial data needed includes the following:
1.   Exports in US$
2.   Imports in US$

3.   Production in US$
4.   Consumption in US$

Shocks needed to run the model are as follows:
1.   Percentage change in prevalence, based on WHO/FCTC targets: risk factors, etc. 30% relative reduction by 2010-2025
2.   Percentage change in Income and Population, based on various macro-economic projections; e.g. United Nations, World Bank, IMF, CEPII, etc.
3.   Percentage changes in basic prices

Other desirable but not essential data inputs are as follows:
1.   Initial Prices
2.   Initial Employment
3.   Initial raw tobacco exports, imports and production.

These yield results in terms of changes in various prices, quantities and employment in the sheet named 'Results'. Also, the initial data is updated after the simulation, in the sheet named 'Final Data'.

CGE model that includes international trade

a.   International Trade

The change in imports of each region from each of the others is determined by three factors: (i) substitution among different sources, based on the differential between import prices from specific sources and the sum of import-augmented technical change and aggregate import prices $pimk_{k,s}$[64], multiplied by the elasticity of substitution of imports between the sources $\sigma_{M,k}$, which is the Armington elasticity for the sector as in GTAP Data Base, (ii) import-augmenting technical change, $amsk_{k,r,s}$, that lowers the effective price of a good in the destination market, and (iii) the import penetration as captured by change in composite imports of subsector commodity k, $qimk_{k,s}$: :

For all sectors k in SECT, regions r and s in REG:

$$qxsk_{k,r,s} = -amsk_{k,r,s} + qimk_{k,s} - \sigma_{M,k} * [pmsk_{k,r,s} - amsk_{k,r,s} - pimk_{k,s}] \quad .... (1)$$

Global transport margins are treated in the same manner as in the standard GTAP model, with the quantity of international trade, transport and insurance services required being a fixed proportion of the volume of goods shipped. Technical change in this sector is represented with the variable $atmfsdk_{k,r,s}$ is obtained by adding up the changes at different levels, which are directly translated from the aggregate changes in the corresponding variables. Trade and transport services are provided at a common price, pt, which represents a Cobb-Douglas aggregation of trade and transport services exports from all regions in the model. Deducting the rate of technical progress from this price change gives the percentage change in the commodity and route-specific transport margin, $ptransk_{k,r,s}$. The price linkages in the model also include export taxes $txsk_{k,r,s}$, export *fob* prices $pfobk_{k,r,s}$, and import *cif* prices $pcifk_{k,r,s}$ as shown in figure 2. Changes in import tariff and export taxes are the policy variables here.

b.   Domestic Consumption

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[64] The substitution effect for a particular flow *(k,r,s)* increases in divergence of import tariff for good *k* from regions *r* to *s*, from the weighted-average tariff of *s*. Since higher weight means lower divergence, this effect decreases in import-shares of region *r* in the total imports by region *s* of the good *k*.

There are three broad categories of consumption of products and services manufactured in a country: private households, government and firms. In addition, each of these categories of agents also consumes imports that are aggregated across exporters, based on the descriptions in section A above. For private households, GTAP assumes CDE (Constant Difference Elasticity) functional form, which is flexible enough to have Linearized Expenditure Systems (LES) and Constant Elasticity of Substitution (CES) as special cases. For government to consume different products and for firms to consume different intermediate inputs, the functional form is CES. There is also a CES nest between domestic and imported products for each of these agents.

c.   Domestic Production

Production function in GTAP involves 3 levels of nests: (1) There is a Leontief function on the topmost part of production system, wherein intermediate inputs as a composite single input and primary factors as another composite single input are complements. (2) Within the intermediate inputs, there is a CES function. (3) Within the primary factor inputs, there is a CES function. With the exception of land and natural resources, which can move only within agricultural and extraction sectors respectively, other factors are mobile across sectors. GTAP-E model, which focuses on energy and environmental aspects, modifies the system above to introduce substitution between energy sectors and capital input, while further introducing substitution (CES) between different types of energy sources to capture channels of emissions reduction.

d.   Links between Production, Consumption and International Trade:

The sub-modules explained above are linked with each other. The percentage change in sector-level domestic consumption, $qdmk_{k,s}$, with corresponding price change $pmk_{k,s}$, substitutes for imported subsector goods, $qimk_{k,s}$, with corresponding price change $pimk_{k,s}$. The CES elasticity between these two variables is $\sigma_{D,k}$, and this substitution takes place based on their respective price differentials from the sector-level domestic prices $pdk_{k,s}$, as illustrated by equations (2) and (3):

For all k in SECT and s in REG:

*qimk(k,s) = qdk(k,s) – σ_D(k) * [pimk(k,s) - pdk(k,s)]*   *……………………… (2)*

*qdmk(k,s) = qdk(k,s) - σ_D(k) * [pmk(k,s) - pdk(k,s)]*   *……………………… (3)*

Domestic market and import price changes are aggregated to domestic price changes by weighting according to their respective shares. $VDK_{k,r}$ is the total value of domestic consumption of goods corresponding to the sub-sector k in the region r, $VDMK_{k,r}$ is the value of domestic consumption of goods produced by the domestic sector k in the region r and $VIMK_{k,s}$ is the value of imports of goods produced by the sub-sector k to the region s.

For all k in SECT and s in REG:

*$pdk_{k,s}$ =$\alpha D_{k,s}$ *$pmk_{k,s}$ +$\alpha M_{k,s}$ *$pimk_{k,s}$*   *……………………… (4)*

where: **$\alpha D_{k,s}$ =$VDMK_{k,s}$ /$VDK_{k,s}$ and $\alpha M_{k,s}$ = $VIMK_{k,s}$ /$VDK_{k,s}$**

Finally, the total changes in supply and demand are equalized to ensure equilibrium, by equating the percentage change in total output $qok_{k,r}$ with the share-weighted sum of exports and domestic consumption for all sectors k in SECT and regions r in REG. When the slack variable $tradslackk_{k,r}$, is exogenized, this equilibrium condition determines the change in market prices, $pmk_{k,r}$ (output, $qok_{k,r}$, is determined by Equation (5).

For all _k_ in _SECT_ and _r in_ REG:

$$qok_{k,r} = \beta D_{k,r} * qdmk_{k,r} + \Sigma_s \beta M_{k,r,s} * qxsk_{k,r,s} + tradslackk_{k,r} \qquad .... (5)$$

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