Parity of Input Prices in Tobacco Production

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ABSTRACT : *In this paper, we explore the parity of prices between selected inputs (NPC fertilizer, pesticide, herbicide, labor, and procurement of John Deer 75kW tractor) which comprise the largest percentage of tobacco production in the Republic of North Macedonia. The results indicate that input prices are growing with higher intensity than the tobacco prices. This worsens the parity to the detriment of tobacco production. There are significant deviations from the optimally defined parities. The consequences that arise out of the violation of parity prices are reflected in reduction of the accumulative and reproductive capacity of the primary agricultural production. Price disparity is manifested in insufficient accumulation of capital, extensive production and lack of investment, primarily in the renewal of agricultural machinery.*

KEYWORDS: *parity, tobacco, price, production.*

I. INTRODUCTION

Tobacco is the main industrial crop and strategically the most important field crop in terms of the largest share in the total export of agri-food products, but also because of its social character.

The pricing policy of agricultural products is an integral part of the agricultural policy in every country. Price is the basic factor that determines the conditions for business operation and the financial condition of the economic agricultural entities in the primary distribution. For this reason, every country is trying to define a system of pricing interventions that is in line with the agricultural development policy. Optimally defined parity prices should affect the stability and profitability of the primary agricultural production. Thus, the producers are motivated to increase the volume and quality of production. The significance of the problem and the purpose of the research in this paper are the problems with price parity which are very important in defining the economic position of agriculture. One of the most important parities is the ratio between the input prices and the price of the primary agricultural products, because the financial position, i.e. the reproductive capacity of agriculture is dependent upon it. (1) The purpose of this paper is to consider the movement of the ratio between the prices and basic inputs (basic fertilizers, means of protection, herbicides, labor) on one hand, and the movement of the price of tobacco for the period 2010-2019 on the other hand.

II. MATERIALS AND METHOD

The main sources for taking data are the State Statistical Office, Ministry of Agriculture, Forestry and Water Economy, as well as data from 10 surveyed individual agricultural holdings in the country. We also used data (prices) from the archives of private companies that have been selling mineral fertilizers, pesticides and herbicides in the recent period. A comparative analytical method was applied, by using mathematical-statistical methods to calculate price parity. The parity is observed through natural indicators, i.e. through the relationship between the exchange of tobacco and the selected inputs. In this manner, the impact of inflation on the manifested phenomena is eliminated.

The parity of prices between production inputs and basic agricultural products are also subject of this paper. A huge number of industrial products that are used as materials for production are spent in the production process. The ratio between the prices of inputs and the basic agricultural products determine the financial condition of agriculture.

III. RESULTS AND DISCUSSIONS

The designing of a production process requires significant investments. At the same time, there is a chronic shortage of working capital. In this context, it is important to consider the movement of parity in the prices of inputs and agricultural products. This parity has a direct impact on the economic position of producers of individual lines in crop production, and thus on agriculture as a whole. The state has indirect influence over the expressed parity, and that influence affects the prices of inputs and primary agricultural products through various measures: sales taxes, direct payments, resources and other fees. The tobacco – the characteristic of the tobacco is to have large fluctuations in the annual movement of prices, due to the fact that the prices of tobacco were influenced by many factors, such as: inadequate application of agro-technical measures (fertilization, irrigation, protection, digging, etc.), production of tobacco varieties which do not meet the market demand, low degree of mechanization in the production process, partial use of seed materials from a registered seed producer, the existing diversity of technological procedures in the primary production until the final processing of the tobacco. (3)
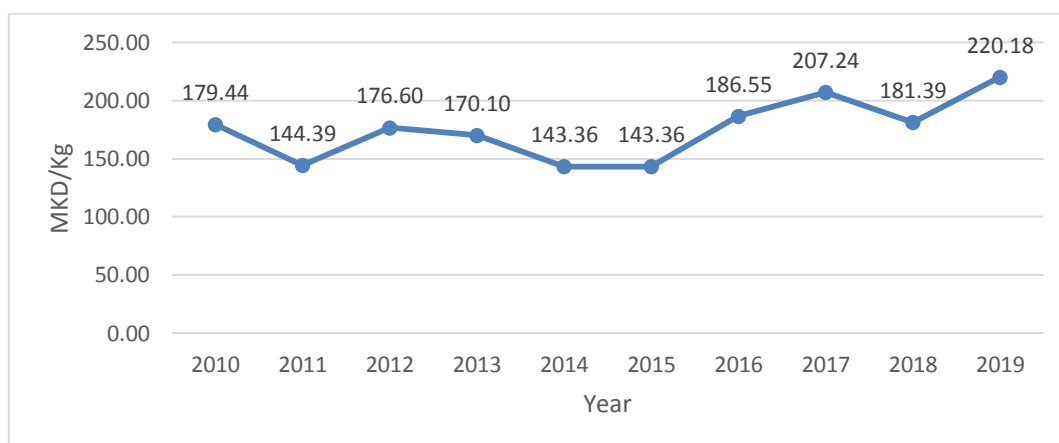

Figure 1: Average purchase prices of tobacco

The presented graph shows that there are large oscillations in the purchase price of tobacco in the encompassed ten-years period. The lowest price is noted in the years 2014 and 2015, and the highest price is noted in 2019. In the years 2014 and 2015 we may see the lowest prices, because, globally, the production of this variety of tobacco was higher and the demand for export from our country was lower; the price is also influenced by the assessment of the quality of tobacco.

Apart from the demand and the quality of the tobacco, the final price is also greatly influenced by the **costs** incurred during its production. The following table shows the total costs for production of oriental tobacco for a period of 10 years.

Table 1. Calculations for production of oriental tobacco with average prices for the period 2010-2019

Production	Unit Measure	Price per Unit, MKD	Quantity	Value MKD/ha	Value EUR/ha	Share , %
Tobacco - Raw	kg	175,26	1.600,00	280.417,60	4.162,60	100

Variable Costs	Unit Measure	Quantity	Price per Unit, MKD	Cost, MKD/ha	Cost, EUR/ha	Share of total costs, %
Initial plow	Work. Days	0,7	7.000,00	4.900,00	79,67	1,89
Plowing	Work. Days	0,7	7.000,00	4.900,00	79,67	1,89
Fertilization – fertilizing machine	Work. Days	0,1	7.000,00	700,00	11,38	0,27
Mineral fertilizers NPK	kg	250	68,00	17.000,00	276,42	6,55
Seedlings (own production)	Seedling beds	18	2.500,00	45.000,00	731,71	17,35
Transplanting-with a machine	Work. Days	2	5.000,00	10.000,00	162,60	3,86
Protective agents (herbicide - storm aqua -	L	5	557,00	2.785,00	45,28	1,07

5l / ha						
pesticide- acrobat MZ WG 2l / ha)	L	2	1.158,00	2.316,00	37,66	0,89
Digging	Work. Days	0,5	7.000,00	3.500,00	56,91	1,35
Other materials	Work. Days			3.000,00	48,78	1,16
Labor costs	Work. Days	1300	89,00	115.700,00	1.881,30	41,26
Transport Costs				10.000,00	162,60	3,86
Drying costs				5.000,00	81,30	1,93
Other variable costs				5.000,00	81,30	1,93
Total variable				**229,801,00**	**3.736,60**	**88,61**
Total income – variable				**26,199,00**	**426,00**	
2. FIXED COSTS						
Tobacco Insurance	%	4		10.240,00	167,73	3,98
Interest	%	8		20.480,00	335,46	7,96
Other fixed costs 1+2				3.000,00	49,14	1,17
Total fixed				**33.720,00**	**552,33**	**13,10**
TOTAL COSTS 1+2				**263.521,00**	**4.316,48**	**100,64**
REMNANT (total income – total costs)				**16.896,60**	**276,77**	

Upon considering the table above, it can be noticed that the highest costs of tobacco production per hectare are the following: labor, that participates with 41.26%, seedlings with 17.35%, and the impact of costs for fertilizers (NPC), herbicides (stomp aqua) and pesticide s(acrobat MY WG) is going to be considered in the further analysis.

Table 2. Total prices of inputs per hectare

	Denars									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
NPK 8x16x24 250kg/ha	17500	17500	17500	17500	17500	17500	16250	16250	16250	16250
Herbicide 5l/ha(stomp aqua)	3400	3400	3650	3650	2092	2092	2200	2120	1995	3272
Pesticide 2l/ha(acrobat MZ WG)	2320	2320	2440	2440	2322	2322	2322	2208	2208	2252
Labor 1300h/ha	92300	97500	104000	106600	110500	111800	120900	128700	137800	146900

Table 2 shows the prices of inputs as a cost for 1 hectare of tobacco production.

The cost required for seedlings is omitted in Table 2, because the price for seedlings has not been changed in the observed period, and its impact on the final price is constant. The above table shows that there are oscillations in the prices of inputs in the observed period.
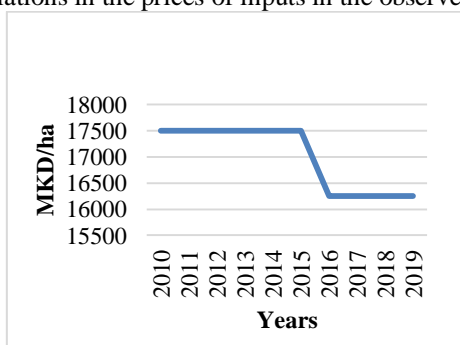

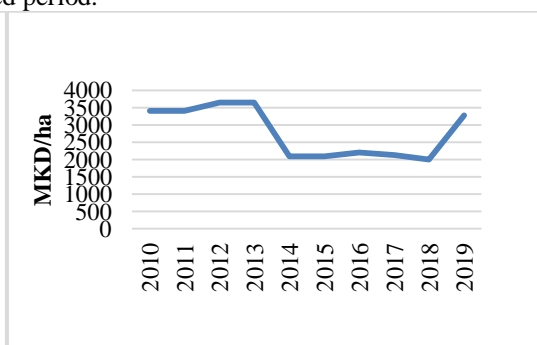Figure 2. NPK 8X16X24   Figure 3. HERBICIDE-STOMP AQUA

According to the table above, and as shown in Figure 2, the fertilizer NPK shows a decrease in the price per hectare in the observed period..

According to table 2, and as shown in Figure 3, there have been oscillations in the price of the herbicide stomp aqua, so that the price decreases in some years, whereas in 2019 the price increases.
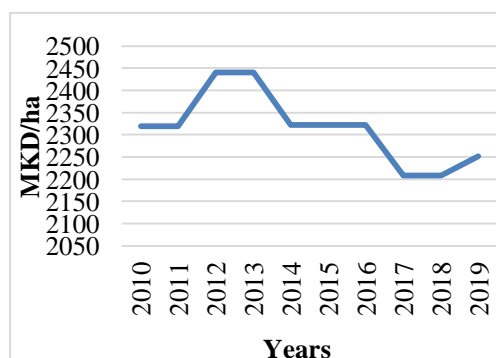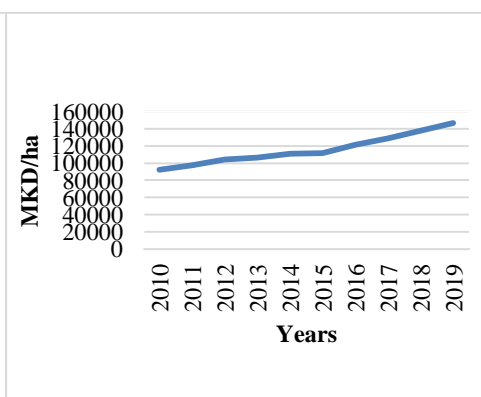

Figure 4. Pesticide-akrobat mz wg   **Figure 5**. Work power

As shown in Figure 4, The price of acrobat MZ WG pesticide has very small oscillations in the reviewed period. Figure 5 shows that the price of labor is constantly increasing and it has the greatest impact on the final price and revenue from tobacco.

Table 3. Parity of prices of inputs in tobacco production

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
NPK 8x16x24	97.53	121.20	99.10	103.46	122.07	122.07	87.11	78.42	89.59	73.81
Herbicide (stomp aqua)	18.95	23.55	20.67	21.46	14.60	14.60	11.80	10.23	11.00	14.86
Pesticide (acrobat MZ WG)	12.93	16.07	13.82	14.35	16.20	16.20	12.45	10.66	12.18	10.23
Work power	514.38	675.26	588.90	630.16	770.79	779.86	648.09	621.02	759.69	667.19
Tractor John Deer 75кW	5757.92	7453.78	6094.28	6507.94	8065.02	8279.51	6428.58	5875.8	7289.55	6563.95

Table 3 presents the parity of prices of inputs in tobacco production in the period from 2010 to 2019. The table shows that 122.07 kg of sold tobacco was required to cover the cost of NPK fertilizer per 1 hectare in 2014 and 2015, whereas only 78.42 kg of sold tobacco were covering cost of NPK fertilizer per 1 hectare in 2017 (Figure 6). On the other hand, 23.55 kg of sold tobacco was required to cover the cost of herbicide in 2011, and only 10.23 kg of sold tobacco in 2017 (Figure 7). The most sold kilograms of tobacco for covering of the cost of pesticide were required in 2014 and 2015 - 16.20 kg, and the least in 2019 - only 10.23 kg of sold tobacco (Chart 8).

In terms of labor force, the most sold kilograms of tobacco were needed in 2015 - 779.86 kilograms, and the least in 2010 - 514.38 kilograms of sold tobacco (Figure 9).

In addition to the costs in this table, analysis were made and data were processed on how many kilograms of tobacco need to be produced in order to purchase a John Deer brand tractor with a power of 75 kW. According to the analysis of the period from 2010 to 2019, we came to the conclusion that in 2015 the most kilograms of produced tobacco were needed - 8279.51kilogram, and the least in 2010 - 5757.92 kilograms of tobacco. The difference that appears in the number of kilograms required for purchase of the above-mentioned tractor is due to the fact that over the years, the price of the tractor is constantly increasing, and the price of tobacco for the same period fluctuates (Figure 10).

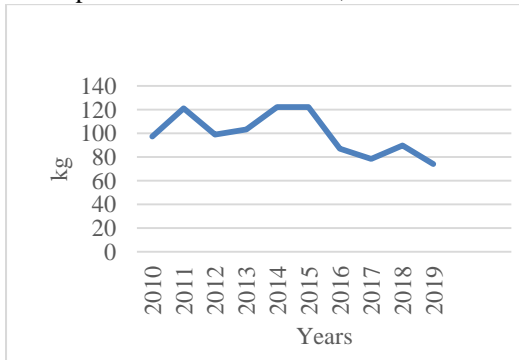Apart from the presentation in the Table, the data are also presented with the following graphs:
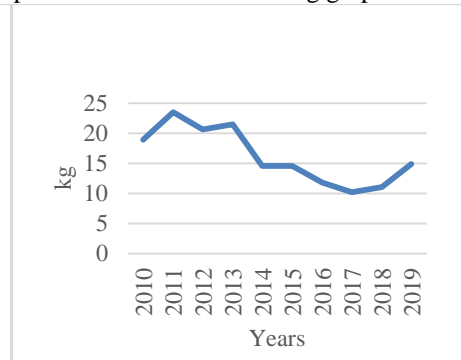
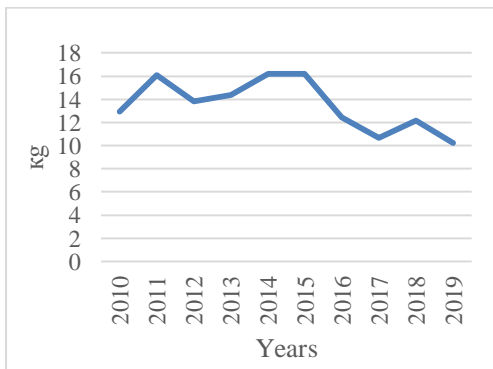Figure 6. NPK 8x16x24   Figure 7. Herbicide (stomp aqua)
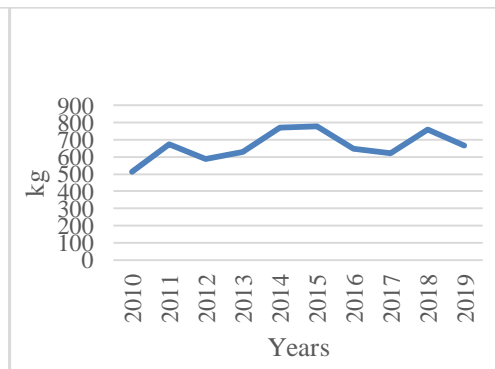
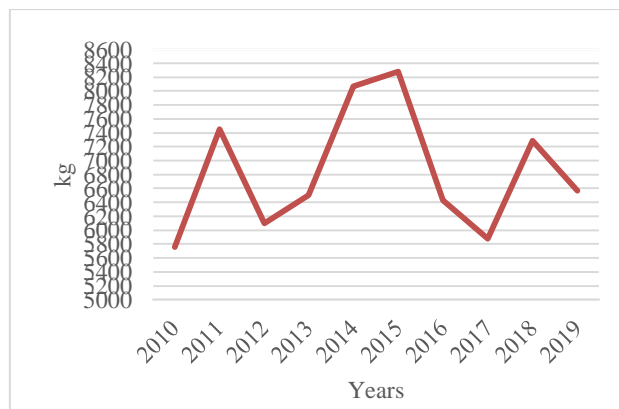Figure 8. Pesticide (acrobat MZ WG)   Figure 9. Labor force

Figure 10. Tractor John Deer 75кW

Table 4 shows impact of inputs on the final price of tobacco per 1 hectare in percentages. The maximum values are marked in green, and the minimum amounts are marked in blue for a period of 10 years.

Table 4 Analysis of the share of inputs in the final price of tobacco for an area of 1 hectare (%)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
NPK 8x16x24 250 kg/ha	6,10	7,57	6,19	6,43	7,63	7,63	5,44	4,90	5,60	4,61
Herbicide 5l/ha (stomp aqua)	1,18	1,47	1,29	1,34	0,91	0,91	0,74	0,64	0,69	0,93
Pesticide 2l/ha acrobat MZ WG)	0,81	1	0,86	0,90	1,01	1,01	0,78	0,67	0,76	0,64
Labor 1300 h/ha	32,15	42,20	36,81	39,17	48,17	48,74	40,51	38,81	47,48	41,70

Labor force participates with the highest percentage in the final price of tobacco, in 2015 that percentage was 48.74%, and the lowest impact was in 2010 with 32.15% .

NPK fertilizer had the highest impact in 2014 and 2015 with 7.63%, and the lowest in 2019 with 4.61%.

Herbicide has the highest impact in 2011 with 1.47% and the lowest in 2017 with 0.64%.

Pesticides had the highest impact in 2014 and 2015 with 1.01%, and the lowest in 2019 with 0.64%.

IV. CONCLUSION

- In the observed time period (2010–2019) there is a violation of parity of prices to the detriment of tobacco production.

- The most intense manifestation of price differences between the researched products appears in 2014 and 2015. - Deterioration of price parity is present in all analyzed agricultural inputs.

- The consequences from price differences are reflected in the reduction of the accumulative and reproductive capacity of tobacco production. In addition to the stated unfavorable parity prices that mainly affect the decline in tobacco production, because it makes the tobacco production economically unjustified, it should also be noted that the unfavorable parity in relation to primary agricultural production is also made with the trade margins and non-compliance with payment deadlines.

- The achieved production results in the field are not accompanied by adequate financial effects, primarily due to the increased prices of raw materials and reduced prices of tobacco. This is especially evident in the analysis made for the years 2014 and 2015.

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