



Colouring the Balassa index: a hermeneutic approach towards Romanian meat imports

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ABSTRACT: Romania has good agricultural resources and declining meat consumption, yet the country's meat imports are on the rise. This study uses Balassa's idea to link national trade patterns to worldwide ones and extends it, for the period between 2004 and 2019, to the ratio between prices and to the ratio between variables describing intra-industry trade. For price ratios, this study showed that Romania imported primarily inferior qualities of meat, particularly at the beginning of the study period. Regarding intra-industry trade, the Romanian trend moves in the opposite direction to the worldwide trend. Although, the trade of meat parts compared with whole/ half carcasses is on the rise internationally, it is declining in Romania, probably due to increasing competitiveness of the industry.

Key words: Romania, meat trade, quality, Balassa Index, prices.

Colorindo o índice Balassa: uma abordagem hermenêutica para as importações de carne da Romênia

RESUMO: A Romênia tem bons recursos agrícolas e declínio no consumo de carne, mas as importações de carne do país estão aumentando. Este estudo usa a ideia de Balassa para vincular os padrões de comércio nacional aos mundiais e estende-a, para o período entre 2004 e 2019, à razão entre os preços e à razão entre as variáveis que descrevem o comércio intra-indústria. Para as relações de preços, este estudo mostra que a Romênia importou principalmente qualidades inferiores de carne, especialmente no início do período de estudo. No que diz respeito ao comércio intra-indústria, a tendência romena move-se na direção oposta à tendência mundial. Embora o comércio de partes de carne em comparação com carcaças inteiras / meias carcaças esteja crescendo internacionalmente, apresenta uma diminuição na Romênia, provavelmente devido ao aumento da competitividade da indústria.

Palavras-chave: Romênia, comércio de carne, qualidade, Índice Balassa, preços.

INTRODUCTION

Romania is the EU member state with the highest share of agriculture in its GDP and has become a notable exporter of cereals and oilseeds over the last years (VLAD & BECIU, 2014). Despite valuable agricultural resources and slightly declining consumption of meat (POPESCU, 2016), Romania imports considerable and even growing amounts of meat.

Romania increased its meat imports from 165 700 tons in 2001 to over 1 million tons in 2019. From the Central and East EU countries that entered in the European Union, only Poland and the Czech Republic had a more accentuated increase

in imports. However, Poland has also become a top meat exporter of the EU, so for Romania with its considerable livestock production potential, the question regarding reasons for its unfavourable trade balance is particularly pressing. While a lot of trade literature focused on a better understanding and a decomposition of exports (KOOPMAN et al., 2014; LOS et al., 2016; ING & YU, 2018), Romania's position in the meat trade is a good case for a closer look into a country's import structure.

In 2019, the country imported 1,052,000 tonnes of meat (67% of which was pork) whereas meat exports amounted to only 269,000 tonnes (57% of which was poultry). The main importers to Romania were Hungary, Germany and Spain, which

each accounted for around 20% of imports. Romania's steady net exports of live animals (VLAD et al., 2015) and net imports of the three major categories of meat (pork, poultry and beef) indicated that insufficient infrastructure of the meat industry in this country may be part of the reason for Romania's position as a net importer. The lack of trust in domestic supply (STANCIN et al., 2013) may be an additional challenge. The level of quality of domestic meat production is a controversial issue. Although, GRODEA, (2017), BECIU & ARGHIROIU (2019) and VOINEA et al. (2019) have voiced reservations about Romanian meat quality, MARIN et al. (2010) report that 98% of Romanian pigs are rated in the top quality category.

General predictors of meat trade quantities such as income, population and production capacity are well known (KAREMERA et al., 2015), and the high level of net meat imports into Romania have been explained by a low level of competitiveness of the industry (POPESCU, 2016). However, this paper aimed to understand the trend of rising meat imports to Romania in more depth and beyond previous comparisons of export and import figures (NICULAE & COSTAICHE, 2015; GARRILESU, 2017). Based on recent trade literature, this paper argued that an idea developed by Bela Balassa in 1963 (BALASSA, 1963) can be extended to additional variables to provide a holistic view of national trade patterns by comparing national and international trade patterns. Based on MCKENNA et al.'s (2019) proposition that "hermeneutic analysis is phenomenological to the extent that it does disclose phenomena", we called this approach hermeneutic. The potential of this approach is explored in the subsequent section. Section 3 then outlines the methodology for the case of Romanian imports of the most important meat categories (pork, beef and chicken). Results are presented in Section 4, and Section 5 provides a conclusion.

The approach of "colouring" a renowned indicator

One of the backbones of economic theory is RICARDO's (1817) concept of comparative cost differences, which described relative trade advantages of one country over another.

In a seminal paper, BALASSA (1963) identified the first and most influential way to operationalise comparative advantages by comparing export (X) shares of a good (i) from a country (j) with the global share of the good's export relative to global exports ($\frac{X_{ij}/\Sigma_j X_{ij}}{\Sigma_i X_{ij}/\Sigma_i \Sigma_j X_{ij}}$). Although, the mean of the Balassa

index has been shown to be greater than one (HINLOOPEN & VAN MARREWIJK, 2001), it is

reasonable to define item-country combinations with an index value greater than one as goods that the country has a competitive advantage in.

While there are good reasons to include an analysis of imports in the analysis of comparative advantages (an addition to the Balassa index by LAFAY, 1992), Balassa's intellectual contribution is probably still underexploited because the index has been restricted to the mere amount of exports and imports. However, the charm of his concept lies in the comparison of national trade patterns with worldwide patterns (HATEMI & IRANDOUST, 2000), and this comparison can give additional insights if more refined variables are taken into account. In this study, the Balassa index was used to explore the realms of prices and intra-industry trade. This may be considered as "colouring" the index, as we add additional aspects being important to obtain a holistic image of trade patterns.

Price relations as a proxy for quality

Particularly in markets of heterogeneous goods, price is the most important indicator of quality (JAYAKRISHNAN, 2016). In a recent analysis of Swiss trade data, MANN (2021) showed that the coffee that Switzerland exports (mainly in form of Nespresso capsules) is eight times more expensive than the coffee it imports (mainly whole beans).

For the meat trade, there is certainly a justification to use price as a proxy for quality due to different parts of animals and different animals having different qualities. This claim can be illustrated with Dutch chicken exports. For many years, scientists have criticised EU exports of chicken "neck, back, legs and wings" (HERMELIN, 2003) to Africa (RUDLOFF & SCHMIEG, 2017) for corrupting domestic competitiveness in African countries. Accordingly, the average export price of chicken from the Netherlands to the United Kingdom in 2019 was, according to the ITC database (ITC, 2020), US\$2.75 per kg, whereas the average export price of chicken from the Netherlands to Ghana in 2019 was US\$0.89 per kg, indicating the inferior quality of chicken parts transported to this country.

In the meat trade, international export statistics distinguish between the following trade classes:
Halved or whole animal carcasses
Animal parts with bones
Animal parts without bones

Almost 90% of chicken exports from the Netherlands to Ghana is chicken parts. To target the export stream in terms of different quality segments, the trade of single parts is, of course, the most effective

option in comparison with trade of whole animals. The dominance of trading meat parts is also the most effective option in the case of positive discrimination of meat qualities: there may be trade flows of high quality meats like fillet or entrecote where average prices well exceed the price of whole or half animals. It can be assumed that in trade classes without bones, positive discrimination will be more frequent than in trade groups with bones. If the trade of meat parts is not used for such quality discrimination, it is probably reasonable to assume that the price ratio between meat parts and whole animals lies between 1.1 and 1.3 due to costs of cutting and packaging.

Considering these factors, the following can be concluded:

The quotient of the import price of meat parts and entire or halved animals into Romania (p_{RP}/p_{RE} = Index P1) can describe the function of meat imports in terms of quality differentiation. It may answer whether Romania's meat demand is (fully or partly) attributable to particularly low or high quality demands.

The quotient of import prices of meat parts and entire or halved animals worldwide (p_{WP}/p_{WE} = Index P2) indicates the general function of meat parts trade in terms of quality differentiation.

The quotient between these two quotients ($\frac{p_{RP}/p_{RE}}{p_{WP}/p_{WE}}$ = Index P3), which largely follows the logic of the Balassa index, indicates Romania's relative position regarding the quality of imported meat parts.

One ex-ante reason to assume that low quality meat is imported to Romania is related to cultural traditions of Romanian cuisine. Several specialities of the country such as şorici (fine stripes of pork skin) and şunculiță țărănească (processed pork meat, fat and skin) use animal parts which are considered inferior by international standards and thus trade for low prices.

Amount relations of trade classes as an indicator of industry competitiveness

If a major share of meat imports is already cut and packaged, discrimination between qualities can be one plausible explanation for this fact, as described above. However, in cases where price ratios between meat parts and halved or whole animals are close to 1.1–1.3, quality differentiation is unlikely to be the cause, and thus the reason may be a lack of competitiveness in the industry. It may be more efficient to have companies abroad cut and package animals than to do this in the country of consumption. Romania, with its fragmented and small-scale meat industry (STANCIU et al., 2015), may be a suitable case to test this hypothesis.

The first major study on intra-industry trade (GRUBEL & LLOYD, 1975) also referenced the Balassa index to explain the exchange of goods in different processing stages (albeit with criticisms because the index would treat all sectors equally, independent of their size). MCCORRISTON & SHELDON (1991) empirically showed that the EU has developed a strong degree of specialization in the value chains of agricultural products, a finding that BALDWIN & LOPEZ-GONZALEZ (2015) later confirmed for the entire economy ("Factory Europe").

It is therefore helpful to compare quantities of trade in meat parts with quantities of trade in entire or halved animals as we assume:

The quotient of import quantities of meat parts and of entire or halved animals into Romania (I_{RP}/I_{RE} = Index I1) can describe the comparative strength of the cutting and packaging industry in the country

The quotient of import quantities of meat parts and entire or halved animals worldwide (I_{WP}/I_{WE} = Index I2) can describe general patterns in worldwide meat trade in terms of the value chain.

Therefore, the quotient between these two quotients ($\frac{I_{RP}/I_{RE}}{I_{WP}/I_{WE}}$ = Index I3), again following the logic of the Balassa index, indicates Romania's relative position regarding the strength of the industry in the meat value chain.

The Balassa index itself would reveal, due to Romania's low meat exports and negative net exports, that the country has comparatively low competitive advantage in meat production. While this may be true, the six quotients introduced above, two of which follow the logic of the Balassa index but with different variables, may help identify reasons for this lack of competitiveness by shedding light on quality and value chain aspects that the original Balassa index does not cover. By that, our "coloured" index may be situated epistemologically between the traditional Balassa index and the different sectoral specialisation indexes like the concentration index by CUTKOVA & DONOVAL (2004). We claimed our proposed indexes to be unique; however, in describing the relation between different parts of the value chain.

METHODS

We used trade data from the International Trade Centre (ITC, 2020) on the main meat categories traded, which are beef, chicken and pork. The period chosen was 2004–2019, a period during which Romania entered the European Union and gained additional purchasing power, a development that also

was reflected by Romanian consumers' food choices through rising consumption figures in the higher market segments (NECULA & MANN, 2018). The trade statistics on meat parts differentiate between frozen and non-frozen meat, which may be relevant for trade distances, but not for the study questions. However, the data also differentiate between meat parts with bones and without bones. This distinction may be relevant as both a proxy for quality and the division of labour between Romanian and foreign companies. Therefore, we aggregated frozen and non-frozen trade classes but distinguished between meat parts with and without bones. This doubles the six indicators developed above to twelve because each indicator can use (1) meat parts with bones or (2) meat parts without bones as the numerator. On this base, their descriptive analysis promises first interesting patterns.

The values of the twelve indicators at a certain point in time may generate some insight, but these insights can be broadened if dynamic development is included in the analysis. Therefore, a simple time-series analysis was used in which the three meat categories were distinguished by using dummy variables for beef and pork (so that chicken was the reference meat category). Weighted least-squares analysis in Stata 16 was used to explain P1 and P2, where traded quantities were used as weights. For P3, such a weight variable was not easily available, nor for the I-indicators, where traded amounts were part of the dependent variable itself. Thus, Ordinary Least Squares analysis was used to

analyze these indicators and the Breusch-Pagan-Test was carried out to exclude heteroscedasticity.

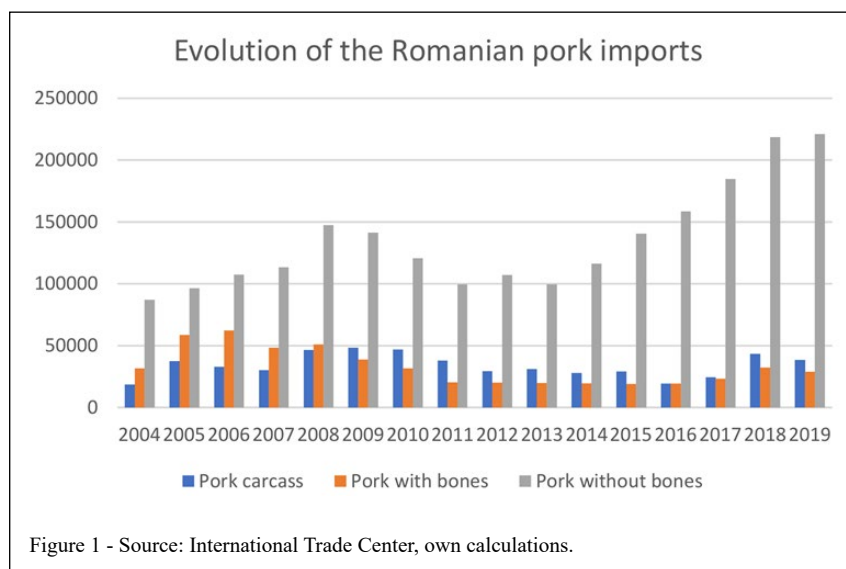
RESULTS

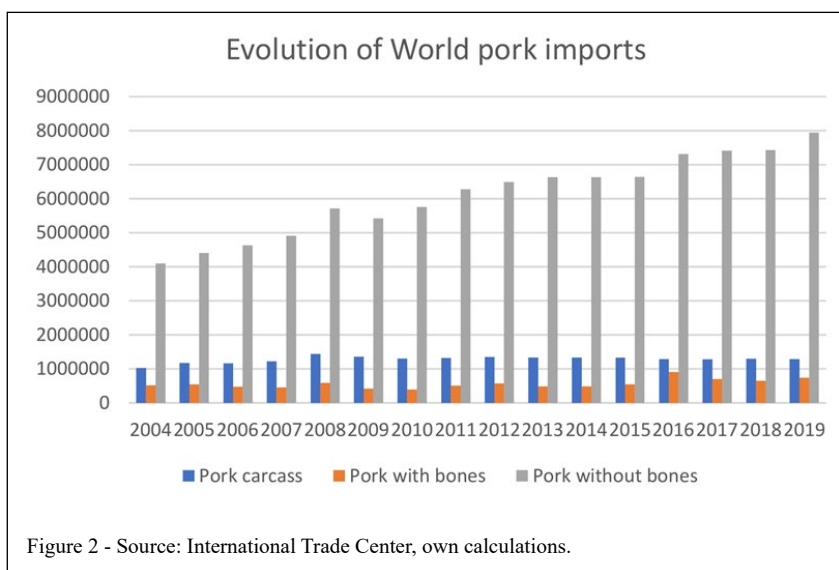
Descriptive results

For a first illustration, pork is used as a case in point to illustrate the development of trade within the different categories in figure 1 and 2. For this meat category, part of the animal without bones is the dominant form, both for Romanian imports and for worldwide trade. It can also be seen that the import quantities have grown strongly, particularly in the case of boneless parts. A thorough mathematical analysis of the figures promises additional insights.

Table 1 indicates that Romanian imports of animal parts with bones seem to be primarily inferior parts of the animal. On average, these parts were priced lower than imports of whole or halved animals. In 2006, as the most extreme example, beef parts were imported for less than half of the price of whole cattle carcasses. On a worldwide scale; however, this is not a universal pattern. If cutting and packaging animals amounts to 10% of production costs, the ratio of 1.10 would indicate that the quality of meat parts with bones does not systematically diverge from quality in halved or whole carcasses. The share of ten percent, though, is difficult to verify because meat packaging is carried out in a very diverse way (FANG et al., 2017), and scientific research about packaging costs is rare.

For parts without bones, the situation looks similar. Deboning causes additional costs; if





deboning (including cutting and packaging) amounts to 26% of production costs, this would mean that trade in deboned meat on a worldwide scale is similar in quality as trade in whole animals and is not primarily used for quality differentiation because, on average, deboned meat sells for 26% more than carcasses. Again, this figure is difficult to verify because the small literature on deboning (BOTTI et al., 2015; TEJINDER et al., 2016) usually is silent on the cost share that deboning adds. However, for Romania, the ratio of 1.05 is considerably less than the international ratio of 1.26, indicating that inferior qualities may also be traded in this category. This resulted in a Balassa index for both meat qualities (with and without bones compared to carcasses) of around 0.9, indicating that Romania may have a slightly disadvantaged position when it comes to the qualities of imported meats. Romanian meat imports seem to have inferior qualities by international standards.

The “I” indicators showed how meat imports are divided among categories; these indicators show that most meat is traded as parts (Table 1). For Romania, this applies to a particular extent, as the focus of meat importers on parts is stronger than on the international average. In 2006, for example, chicken and beef were almost exclusively imported in parts. Average values indicate that, overall, most meats in Romania were imported as deboned meat. For every animal category and for every year, imports of deboned meat were at least twice as high as the import of whole or half animals. A; average; however, the ratio was much higher, at 17 for boned meat and 70 for deboned meat. In contrast, the worldwide trade

in animal parts with bones was twice as high as trade in carcasses, and worldwide trade in deboned parts was six times as high as carcasses. However, in some individual years and animal categories, carcass trade exceeded trade in animal parts; for example, in 2013, Egypt imported an exceptional number of whole chickens, which exceeded trade in chicken parts.

The I3-indexes show the shape of differences between Romanian and world markets. The difference between the national and the international markets differ by only a factor of five when it comes to parts with bones (i.e., moderate forms of processing), but this factor rises to almost 10 when deboned meat is considered. These points to the weaknesses of the meat processing industry in Romania.

Multivariate results

Tables 2 and 3 depict the results of the regression analysis. The analyses indicated several significant correlations for Romanian imports. For chicken, the reference group, the inferiority of imported meat parts seems to be more significant than for pigs and cattle. However, the time trend was also significant, indicating that the quotient between meat parts and carcasses rose around 1% per year. The descriptive statistics showed that Romania had a systematic bias towards inferior quality meat imports at the beginning of the study period, but the regression analysis suggests that this bias dissolved over time.

The interpretation of the worldwide coefficients becomes more helpful if the ongoing debate around p-values is taken into account

Table 1 - Descriptive statistics of variables used.

-----Dependent Variables-----				
Variable name	Variable description	Mean	Minimum	Maximum
P1-1	Price of Romanian imported processed meat (with bones) divided by price of imported half or whole animals	0.922	0.422	1.38
P1-2	Price of Romanian imported processed meat (without bones) divided by price of imported half or whole animals	1.05	0.226	2.00
P2-1	Price of worldwide imported processed meat (with bones) divided by price of imported half or whole animals	1.10	0.784	4.96
P2-2	Price of worldwide imported processed meat (without bones) divided by price of imported half or whole animals	1.26	0.827	4.97
P3-1	P1-1 divided by P2-1	0.905	0.153	1.41
P3-2	P1-2 divided by P2-2	0.886	0.153	1.83
I1-1	Amount of Romanian imported processed meat (with bones) divided by amount of imported half or whole animals	16.5	0.534	256
I1-2	Amount of Romanian imported processed meat (without bones) divided by amount of 9999999 imported half or whole animals	69.7	2.57	1980
I2-1	Amount of worldwide imported processed meat (with bones) divided by amount of imported half or whole animals	2.05	0.301	5.06
I2-2	Amount of worldwide imported processed meat (without bones) divided by amount of imported half or whole animals	6.20	0.580	16.0
I3-1	I1-1 divided by I2-1	5.37	0.636	50.6
I3-2	I1-2 divided by I2-2	9.64	0.491	206
-----Independent Variables-----				
Time	2004= 1, ..., 2019=16	8.5	1	16
Cattle	1 if figures for cattle, 0 otherwise	0.333	0	1
Pig	1 if figures for pigs, 0 otherwise	0.333	0	1

(MCCLOSKEY & ZILIAK, 1996; SULLIVAN & FEINN, 2012; ROMMEL & WELTIN, 2020). The coefficients indicate that for meat parts both with and without bones, the worldwide rise in price relations exceeds that of Romania. However, the relatively high standard error in the worldwide development value indicated that this is not a significant trend.

For the P3 indicators, it is a little surprising that the small difference between Romanian and the worldwide development does not result in a significant time trend of the variable. However, the significant dummy variables show that Romanian imports of pork (with bones) and beef (without bones) have relatively better qualities than chicken, also if compared to international quality relations.

While the analysis of price ratios shows similar developments between Romania and

the rest of the world, this is not the case for the composition of imports. On a worldwide scale, there is a significant trend towards trading selected deboned parts instead of whole or half carcasses. The worldwide figures also showed that cattle and pigs are increasingly traded without bones. The situation in Romania is very different. At the beginning of the study period, Romania imported almost exclusively meat parts, and there has been a steady decline in the quotient between meat parts and carcasses. It seems that companies within the Romanian value chain have become increasingly able to cut and package carcasses themselves.

Given this disparity, it is logical that both I3 variables declined over time. For beef, for example, I3 indicators were at 7.8 (with bones) and 22.7 (without bones) in 2004 and decreased to 0.67

Table 2 - Explanations of import price ratios by OLS analysis.

	P1-1	P1-2	P2-1	P2-2	P3-1	P3-2
Time	0.00922** (2.57)	0.0141*** (3.14)	0.0181 (0.34)	0.0165 (0.89)	-0.00682 (-0.95)	0.00192 (0.23)
Cattle	0.249* (1.93)	0.689*** (4.25)	-0.229 (-1.14)	-0.138 (-0.67)	0.0890 (1.10)	0.383*** (4.09)
Pig	0.285*** (6.08)	0.313*** (5.30)	-0.320 (-1.47)	0.123 (0.55)	0.309*** (3.91)	-0.0271 (-0.29)
R ²	0.48	0.50	0.50	0.05	0.36	0.36
n	47	47	48	48	47	47

t-values in parentheses; *P < 0.05 **P < 0.01; ***P < 0.001.

(with bones) and 0.64 (without bones) in 2019. This indicates that the meat industry in Romania has strengthened considerably during this period.

CONCLUSION

The Balassa index was developed to compare national and worldwide patterns. While Balassa focused on export shares of different goods, his idea can be extended to other fields of trade analysis. This exercise, applied to the growing net imports of meat to Romania, provided insights that would have been difficult to generate otherwise.

The analysis shows that in the early 21st century, when Romania was still a relatively poor country, the quality of meat imported into the country were relatively inferior. Since that time, the relative price of meat parts compared to whole carcasses has constantly risen. Similar rises have also occurred on a worldwide scale, and thus Romanian meat imports followed a global pattern.

In the early phase of the study period, the vast majority of meat imports to Romania was animal parts, mostly deboned. One reason is probably that it is possible to select certain qualities (for the Romanian case, mostly inferior ones) of the animal body, which

are traded depending on demand patterns. More importantly; however, it seems that the Romanian meat industry was not competitive in cutting and deboning meat, so foreign companies covered this part of the value chain.

The competitiveness of the value chain in Romania must have risen because the dominance of imported meat parts declined between 2004 and 2019. Notably, this trend was the opposite to worldwide trends. On an international scale, figures showed that trade in meat parts, particularly deboned parts, is on the rise compared with trade in whole or halved animals. Therefore, the Romanian countertrend must have a strong structural reason.

The fact that Romania is a net importer of meat is; therefore, caused by an uncompetitive value chain. The reasons for the increase in demand for imported meat; however, have to be identified elsewhere and are likely related to primary production on farms. Path dependency may play a role in explaining the lack of investments in domestic animal production. It might be worthwhile incentivizing investments in animal production, so that the Romanian meat industry, which has become more competitive, could increasingly link to domestic primary production again.

Table 3 - Explanations of import share ratios by OLS analysis.

	I1-1	I1-2	I2-1	I2-2	I3-1	I3-2
Time	-2.76** (-2.48)	-16.41* (-1.83)	0.013 (0.62)	0.142*** (3.25)	-0.658*** (-3.03)	-1.97** (-2.09)
Cattle	-37.4*** (-2.99)	131 (1.31)	-1.64*** (-7.15)	6.47*** (13.16)	-8.23*** (-3.38)	7.29 (0.69)
Pig	-42.4*** (-3.45)	-39.1 (-0.40)	-3.24*** (-14.1)	1.08** (2.19)	-8.72*** (-3.64)	10.2 (0.98)
R ²	0.32	0.13	0.82	0.83	0.38	0.14
n	47	47	48	48	47	47

***P < 0.01 **P < 0.05 *P < 0.1; t-values in parentheses.

This showed the important interlinkages between primary production and the rest of the chain. The agricultural policy that has a focus on the sector's competitiveness (and is not solely transferring income or conserving the environment) should always take care for the processing industry. If the industry suffers from missing competitiveness, it will be very difficult for farmers to market their animals.

Due to the novelty of the method; however, more evidence is to be added. The most severe limitation of our study is the missing experience with the indicator. A broader application would generate more evidence about the potential and the limits of a "colored" Balassa index.

DECLARATION OF CONFLICT OF INTEREST

The authors declare no conflict of interest. Nobody except the authors had any role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

AUTHORS' CONTRIBUTIONS

All authors contributed equally for the conception and writing of the manuscript. All authors critically revised the manuscript and approved of the final version.

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