ARE EMPLOYEES PAID THEIR MARGINAL PRODUCT? ANALYSIS OF WAGE SETTING PRACTICES FROM BULGARIA

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Abstract: Neoclassical theory contends that factors of production are paid according to the value of their marginal product. We test this assumption by examining data from job adverts by big employers from the retail sector in Bulgaria. The results show that while these companies follow nation-wide pricing policies for their final goods and services, they pay different wages in different regions, taking into consideration the state of the local labour market.

Keywords: labour market, wages, marginal productivity theory.

INTRODUCTION

Marginal productivity theory is a core tenet of neoclassical economics. It is featured in introductory textbooks where it is often presented uncritically and its empirical validity is rarely questioned. Probably this is the case because it is a logical consequence of the main assumptions of the neoclassical school of economic thought – rationality, maximisation and perfect information. The neoclassical theory of distribution has not only positive, but also normative dimensions. In light of its theoretical significance and potential policy implications it is surprising that it is not subject to more empirical scrutiny. The structure and conduct of business of some retail chain stores in Bulgaria, including their hiring and wage-setting practices, allows us to test the theory in a quasi-experimental setting.

EXPOSITON

Marginal productivity theory – a brief overview

The neoclassical theory of distribution is an application of marginal analysis to the payments of the factors of production. Given that certain assumptions are true, each factor will be remunerated according to its marginal productivity. In the case of labour, wages will depend on the marginal contribution of labour. This follows automatically if firms are rational maximisers operating in perfect competition. Assuming a downward-sloping demand curve and a flat or rising labour costs curve, firms will employ labour up to the point where the marginal revenue product of labour and its marginal costs become equal. If firms employ less than that, they will miss an opportunity to increase their profit. If they employ more, they will incur losses. As firms follow the rule $MFC_L=MRP_L$, labour will receive the value of its marginal product, however there are exceptions. If there are market imperfections on either the final goods market or on the market for inputs, even if the firm follows the maximisation rule, labour will be underpaid relative to perfect competition. When the firm has a monopoly power on the final goods market, $VMP_L>MRP_L=MFC_L$ and labour gets less than the value of its marginal product. If the firm has a monopsony on the labour market $MRP_L=MFC_L>S_L$ and labour is paid less than the revenue, generated by its marginal product. While a monopsony faces a downward sloping MRP_L curve it is not its demand curve for labour, because it is possible that the same quantity of labour can be optimally employed by the firm at different wages.

Marginal productivity theory is criticised for the lack of its practical validity. For it to hold, there must be marginal products and products are only marginal if production increases as a result of

a change in the quantity of labour while holding capital constant. Such changes are possible, but may not be a reasonable way to increase production when the additional employment of both labour and capital will give much better results. And if the firm adds more of both capital and labour it becomes impossible to delineate the contribution of each. A related, but lesser known criticism is that even if capital is held constant, labour must increase alongside with material inputs (Moseley, 2015). Another, albeit somewhat contradictory criticism, is that firms don't follow the maximisation rule in the short term because they underutilise the capacity of their capital, which gives them more flexibility to respond to changes in demand conditions.

Putting the theory to the test also poses challenges. When comparing productivity and wages between sectors, the first step is to determine the production functions. Marginal productivities are calculated from the estimated production functions and then compared to the existing wages. However, the determination of the production function can be difficult and the result may be unreliable. Many attempts to test the theory use aggregated data (Biewen & Weiser, 2011) and marginal productivity is implied from average productivity, because it is directly observable. Another problem is that the macroeconomic production function is an aggregate of microeconomic production functions, which is problematic on more than one level, one of them being that capital is not homogenous (Jael, 2019). Even on the individual plant level data on wages may be commonly available, but it is difficult to measure individual productivity (Ilmakunnas & Maliranta, 2003). Some even claim that it is not possible to test the marginal productivity theory at the level of the individual worker because for many jobs it is impossible to represent the result of specific workers in physical units and even when such units are observable, the contribution of the individual worker may be conditional upon the performance of other people (Felipe & McCombie, 2015).

Biesebroeck (2015) surveys the various ways to measure productivity and their appropriateness for different purposes. Physical output is the obvious start as it is most transparent and intuitive, but it can be used only at the level of individual workers or at most at the level of plants, and when the units of observation are comparable (homogenous). It becomes more problematic when there are multiple outputs. Then it is better to use gross output, defined as the total number of products multiplied by the price. The downside is that the final selling price of the product includes the prices of intermediate products and differences in the quality or price of intermediates can lead to different results. This problem can be circumvented by using value added, instead of gross output.

Characteristics of the examined retail chain stores

The hiring and wage-setting behaviour of two of the biggest retail chain stores in Bulgaria allows us to test the marginal productivity theory in a quasi-experimental setting without facing many of the problems that accompany the empirical tests of the theory. We find that "Kaufland" and "Lidl" are appropriate for this choice for several reasons. Both of them are large employers on the national level. With its 7138 employees "Kaufland" is 2nd of all private sector employers, while "Lidl" is 21st with 2712 employees[6]. More importantly, employment is not geographically concentrated and is approximately proportionally spread on the territory of the whole country - "Kaufland" have 59 stores in 34 towns, and "Lidl" have 99 stores in 48 Bulgarian towns[7]. Thus, the probability of exercising monopsony power in their places of operation is low. These are also companies that by Bulgarian standards have high volumes of annual revenue. "Kaufland" occupies the 6th place with 1,57 billion levs, whereas "Lidl" is 14th with 0,94 billion[8]. "Kaufland" and "Lidl" have shares of 13,8% and 7,9% of the retail market for fast-moving consumer goods[9]. While they are clearly not monopolists, we can't rule out completely the possibility for market power.

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[6] According to ICAP Bulgaria report for 2018 titled "Leading employers in Bulgaria". Available at http://www.icap.bg
[7] Kaufland - https://zanas.kaufland.bg/presa/pressuobshteniya/presa-kontakt.y=2019.m=02.n=kaufland-veliko-tarnovo-otkrivane.html , Lidl - https://corporate.lidl.bg/za-lidl/nashata-istoriya
[8] According to K100 Capital website rating at https://www.capital.bg/kpro/klasacii/k100/#rating-menu
[9] According to "Kaufland"s annual financial report for 2018, published at the website of the Bulgarian trade registry (http://brra.bg)

These companies conduct their businesses through almost identical department stores in the different locations. Each store employs the same number of people[10], uses the same type of capital equipment and technologies, and implements identical corporate style of management. Which is why it is not necessary to estimate a production function – whatever it is, it is identical for each department store. The similarity of the department stores as separate units of production solves the problem of firm heterogeneity. Likewise, given the homogeneity of capital inputs, technology, and management, alongside with the type of work performed by department store clerks, we can assume that for practical purposes there will be no significant variation in the productivity of individual workers from one store to another, because even if employees differ in their individual qualities, the work environment and the job characteristics constrain the expression of these differences. There is no reason to believe that a randomly selected clerk from a department store in a big city will be more productive than a clerk, who performs the same type of work in a store in a smaller town.

Given these limitations we will have identical productivity in physical units. For this to hold in value units, supply costs and prices of final goods must also be the same everywhere. Department stores don't procure their capital and input material autonomously, this is a centralised activity, as both "Kaufland" and "Lidl" have national logistic centres, which are used for distribution to their particular department stores. These retail chains have nation-wide advertising campaigns and price their goods in the same way in each department store. Hence, productivity in value units should also be the same. Assuming the validity of marginal productivity theory, this means that labour is paid the same, provided that there are no regional differences in the market structure.

Even if "Kaufland" and "Lidl" had monopoly power on the final goods market, their nationwide pricing policies show that they at least are not price-discriminating monopolies at the regional level. It is also true that demand conditions for fast-moving consumer goods are different in the different settlements as a whole, however it is unlikely that any given department store faces substantially different demand conditions, because the number of stores rises together with the number of inhabitants[11]. As factor demand is derived from the demand for final goods, the staffing of each department store is carried out under similar labour demand conditions.

Another issue for consideration is whether "Kaufland" and "Lidl" have monopsony power in the smaller towns. While it is true that the number of people required for one department store will weigh more on the labour market in smaller towns, the total employees required for all the stores in towns with bigger population is also higher, so proportionally "Kaufland" and "Lidl" hire similar shares of the labour force in the different locations of operation.

Data and results

We examined data on job openings from the online job market jobs.bg in October 2019. Kaufland had 49 job adverts, of which some management and expert positions, without having their wages posted, and 24 positions from 15 towns for department store clerks, for all of which the wages figured in the advert. Lidl had 23 job openings with the wage posted, all of them for the positions of department store clerks and in different towns. Based on the data, we have composed a table with the payment scales for the two retail chain stores. They both use a 4-tier payment scale, tier 1 being the lowest, and tier 4 being the highest. The results are shown in Table 1.

Table 1. Payment scales

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[10] According to a 2015 interview of Kaufland Bulgaria's CEO the company employs 150 people per department store. The interview is avaliable in Bulgarian at https://zanas.kaufland.bg/nedvizhimosti/razvitie-na-nedvizhimostite.html (last accessed on 01.11.2019).

[11] For example, in the last quarter of 2019 Sofia has a population of 1,2 million people and 10 "Kaufland" stores, Plovdiv and Varna have a population between 300 and 350 thousand and respectively 5 and 4 stores , Ruse has less than 150 thousand inhabitants and 2 stores, while Veliko Tarnovo – 70 thousand and one store.

Kaufland wages, BGN				Work Shift	Lidl wages, BGN			
Tier 1	*Tier 2*	*Tier 3*	*Tier 4*		*Tier 1*	*Tier 2*	*Tier 3*	*Tier 4*
400	425	500	600	*4 hours*	435	490	570	600
600	638	750	900	*6 hours*	n.a.	705	820	900
800	850	1000	1200	*8 hours*	800	900	1050	1200

Tables 2 and 3 show the distribution of stores into tiers and locations, together with an additional column for the average wage in the counties of the locations from the respective tier. Figure 1 shows the estimated correlation between tier payment and the average wage at the locations of the department stores from the tier[12].

Table 2. "Kaufland" tier locations

Tier	Department store location	Kaufland's wage, BGN	Avg. wage in county, BGN
1	Sofia	1200	1433
2	Plovdiv[13], Varna	1000	949
3	Gorna Oryahovitsa, Kardzhali, Kazanlak, Pernik, Plovdiv, Ruse, Yambol	850	858
4	Blagoevgrad, Dupnitsa, Gabrovo, Pazardzhik, Pleven, Stara Zagora	800	794

Table 3. "Lidl" tier locations

Tier	Department store location	Lidl's wage, BGN	Avg. wage in county, BGN
1	Sofia	1200	1433
2	Burgas, Plovdiv, Varna	1050	950
3	Asenovgrad, Dobrich, Gabrovo, Kardzhali, Kazanlak, Pazardzhik, Razgrad, Ruse, Samokov, Shumen, Smolyan, Stara Zagora, Veliko Tarnovo	900	825
4	Blagoevgrad, Dupnitsa, Haskovo, Peshtera, Provadia, Targovishte	800	772

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[12] The data for the average county wage is for 2017, which is two years prior. The county also includes smaller settlments, not just the county centres where the stores are located. However, this is valid for all observations and we assume that the data is not systematically skewed.
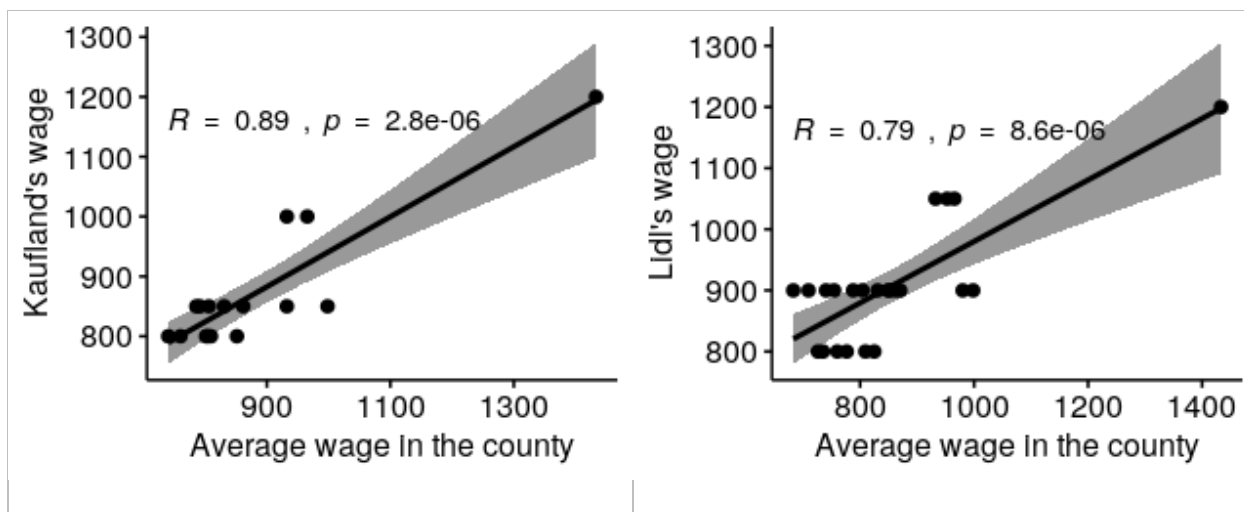[13] Plovdiv had two job ads for two different stores with two different wage scales.

Fig. 1. Correlation between county wage and chain store wage, according to store location

It is obvious that chain store wages correlate strongly with the average wage in the counties of their location. But, as we have shown above, the productivity of randomly selected workers between the different department stores should be identical – both when measured in physical and in value units. This means that marginal productivity theory doesn't hold in this particular case. Why it doesn't hold, requires an explanation. The most obvious explanation is that firms don't follow the maximisation rule $MRP_L=MFC_L$. If they face identical production functions and demand conditions, they should hire more when wages are lower – the optimum capacity for stores in the different locations will be also be different. Yet, the stores employ the same number of people. There are alternative explanations that are in line with neoclassical theory, but while possible, the probability for them being true is low. Theoretically, under monopsony the same quantity of labour can be hired at various wage levels, thus satisfying the maximisation rule. Given the large number of examined store locations it is very unlikely that the monopsony power in each town will be of the exact composition, which will lead to conditions of monopsony power resulting in identical labour quantities everywhere.

Another possible explanation for the different wages is the Balassa-Samuelson effect (Asea & Corden, 1994). Originally, the effect was intended to explain differences in the price levels between countries, but it can be applied to regions of the same country, too. Usually productivity differentials between different locations are much bigger for tradable than non-tradable goods. Where productivity is higher for tradable goods, wages will also increase, and this will not be limited only to the workers in the tradable sector. Because workers in the same location can switch jobs from the tradable to the non-tradable sector and vice-versa, labour market arbitrage will push up the level of wages in the non-tradable sector, even if productivity there has remained the same. This will also lead to higher prices of non-tradable goods and services. That is why there are substantial differences in the earning of hairdressers or bus drivers in different countries, even when their productivity, as measured in physical output, is almost equivalent.

In practice it may be difficult to categorise some sectors as either tradable or non-tradable. Spatially dispersed production is an indication of non-tradability (Frocrain & Giraud, 2019). Using this criterium we can assume that department store clerks are employed in the non-tradable sector. Then differences in payment can be attributed to the fact that generally productivity is higher in cities like Sofia versus e.g. Blagoevgrad. However, this doesn't explain why the chain stores don't employ more people for their stores in the towns where wages are lower.

There is also a non-trivial deviation from the predictions of the Balassa-Samuelson hypothesis, where differences in earnings in the non-tradable sector go along higher prices. In the examined case the prices of final goods are identical, not different. Of course, "Kaufland" and "Lidl" don't produce the goods, they sell them, but it would be difficult to devise a production function without having the

sold goods in the output. One might argue that retail is a service that is independent of the physical volume and the value of the goods, and that department store clerks are simply paid for their services. But it would be unclear how to measure only the value of the service. If it is through the production costs for the service itself, which in this case would equal the remuneration of the workers, then marginal productivity would hold, but as a mere tautology.

CONCLUSION

It is difficult to reconcile the wage-setting behaviour of some of the retail chain stores in Bulgaria with marginal productivity theory. Regional variation in the payment of department store employees is common, even though they work under practically identical conditions and have identical productivity. Regardless of the differences in the payment, stores are staffed with the same number of workers. While in theory there are explanations that are still in line with marginal productivity theory, the more likely and straightforward explanation is that the examined firms 1) pay what the market allows them to, and 2) don't use the maximisation rule for the determination of the optimal amount of labour per store, but a predetermined fixed quantity that is operationally acceptable for the running of business activities.

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