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Integrating the rent gap into the ground rent theory. Measurement and implications for different models of agriculture

Bazyli Czyżewski[1, CDFMR] , **Piotr Lis**[2, CDFMR] , **Izabela Czyżewska**[3, CDFMR]

[1,2]*Poznań University of Economics and Business*, Faculty of Economics, Poznań, Poland, [1]e-mail: bazyli.czyzewski@ue.poznan.pl (*corresponding author*), https://orcid.org/0000-0002-6324-2723; [2]e-mail: piotr.lis@ue.poznan.pl, https://orcid.org/0000-0001-7942-2668; [3]Independent researcher, certified real estate appraiser (professional entitlement no. 6612), e-mail: biuro@evertis.pl

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Abstract. The aim of this paper is to integrate the development of the rent gap theory into the ground rent theory, proving that in the neoclassical approach there is no place for the occurrence of a rent gap. A classification of potential farmers' reactions to the rent gap within different farming conditions is made. From an empirical perspective, an attempt is made to determine the level and dynamics of the rent gap in agriculture in Poland, in the regional cross-section. The authors use the income approach and the Capital Asset Pricing Model (CAPM) for estimating the capitalisation rate. It has been found that the rent gap is a permanent phenomenon in Polish agriculture, the dynamics of which largely depend on macro-economic factors. Three scenarios of farmers' response to the rent gap are identified in the paper. Measuring the rent gap can be a step towards determining the quasi-market value of environmental amenities of land.

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1. Introduction

Rural functions are being changed by overlapping processes. In particular, three of these processes involve gentrification and result in increased capital and residential flows in rural space:

1. peri-urbanisation and the development of residential functions (Nelson, 2018; Sutherland, 2019; Clark & Pissin, 2020),
2. the development of tourism, including agritourism (Smigiel, 2023; Müller et al., 2021); and
3. renewable energy investments, e.g. photovoltaic and wind farms, which lead to the capitalisation of environmental amenities in land and rental prices (Wasson et al., 2013).

The classic rent gap theory (Smith, 1979; Clark, 1988, 1995) was developed for metropolitan areas and focuses on "the movement of capital": while buildings are ageing, the market value of capitalised property components falls, and the potential land rent rises. This is because more central locations are steadily gaining in attractiveness. As a result, the potential income achievable through its "highest and best use" increases (Risager, 2022). Understood in this way, the rent gap between the current and potential rental income generally exceeds the discounted market value of the renovation expenditure required to renovate old buildings, and the more revitalised the neighbourhood of the old property is, the greater the rent gap is. This can lead to social tensions, as existing tenants pay rents below market value and often cannot meet the rent increase expected by the owner. On the other hand, tenants are subject to far-reaching legal protection, and terminating leases with them is time-consuming and costly. Another barrier to bridging the gap is legal protection afforded to historic buildings, which often forces investors to use solutions that are not commercially viable. Over time, however, there is an influx of wealthier people into the revitalised neighbourhoods and the rent gap closes. The duration and amount of the rent gap thus depends on the complexity of social relations, the mobility of particular population groups and the speed of conversion of invested capital in the context of legal regulations and the institutional framework (Slater, 2021; Gray, 2022;).

The processes described above can also be identified per analogy in agriculture, but their persistence and genesis are different. One manifestation of the agricultural rent gap is the difference between the potential rent discounted in the market value of agricultural land and the rent currently paid by leaseholders, or the operating surplus received by the landowner. The rent gap seen in this way widens as the range of potential utility of agricultural land ("highest and best use") expands and its supply decreases. Some authors point out that land prices are becoming increasingly detached from rental prices (Ciaian et al., 2021). *Per analogy* with metropolitan processes, one could also say that land under agricultural production is like a flat with an unwanted tenant who cannot afford to pay the market rent, or like a historic building whose renovation is economically unsound but whose demolition is impossible for legal reasons. In the case of agricultural land, there is, among other things, the social and political rationale that makes it difficult or impossible to be withdrawn from agriculture. Various authors highlight such issues as food security (Ibrahim et al., 2023), agricultural policy (Erjavec et al., 2021), as well as environmental public goods (Kerkhof et al., 2010).

The agricultural rent gap is thus to some extent the result of the progressive financialisaton of the land factor. There is a clear trade-off between the need to systematically increase agricultural production in the context of global demographic dynamics, the need to reduce emissions from agriculture and the growing housing needs of the population migrating from rural to urban areas.

However, in the mainstream ground rent theory since the marginalist revolution, the possibility of a rent gap occurring has not been admitted (Bourassa, 1993). The source of the capitalised ground rent is the inelastic supply of land and differential rents in the case of greater utility of a given plot of land (Robinson, 1948). Each hectare of land has a transfer price derived from demand plus a differential rent. Thus, the ground rent capitalises in the form of a rental fee or operating surplus; otherwise, the land is transferred to a new owner.

There are very few recent studies that address the agricultural rent gap phenomenon in the context of rural gentrification. The most comprehensive analysis of rural gentrification using the rent gap theory was conducted by Nelson and Hines (2018). These authors made a review of the previous demand-side approaches to gentrification, as well as contributing to the supply-side explanations of this process while demonstrating how restructuring agriculture and inflows of capital produce rural petrifiable space. However, the cited analysis concerns a different model of agriculture than the one that operates in the EU. The main differences result, among other things, from the following facts: although the GDP contribution of agriculture in the

EU and US is quite similar (€260 billion in the EU-28 vs I$288 billion in the US; Congressional Research Service, 2016), the EU agriculture uses about 457 million acres of land vs 1002 million acres in the US; there are almost 11 million farms in the EU vs 2.1 million in the US. Hence, the land productivity per ha in the EU (measured in I$) is almost two times higher than in the US (Czyzewski & Kryszak, 2022), and the process of land consolidation has been much slower in the EU. In the European reality, the notions of "devalued ranchlands" or "post-productivist rurality" used by Nelson and Hines (2018) are hardly applicable (for example, in Eastern European Countries, "productivist rurality" concerns 1–2% of farms). The Common Agricultural Policy (EU CAP) has done its best to compensate farmers for less favoured farming conditions or conversions to sustainable practices and to keep farmland in agricultural use and even to sustain unprofitable agricultural production. Hence, the rent gap emerges in the European farming model, where capitalised land rents either remain stable or incrementally rise, while potential land rents escalate much more rapidly due to residential development and the "greening" of the rural economy through renewable energy sources (RES development). In these circumstances, farmers' response to rent gap is not simply to free up land from agricultural production for new activities. Various scenarios are possible, including the long persistence of farms under conditions of a growing rent gap or attempts to bridge the gap. We believe that it is necessary to identify potential scenarios of farmers' responses to the rent gap by covering both the US and EU-28 perspectives, i.e. the "counter-urbanising amenity migration" and restructuring in agriculture that results in converting farmland to residential purposes (Nelson & Hines, 2018); perpetuating the rent gap by public policies, tradition and historical path-dependency; bridging the rent gap by the policy support or investment and higher efficiency.

To briefly sum up other findings, Wang et al. (2023) argue that agricultural land can generate production rent, ecological rent and landscape rent. Thus, farmland should be protected in favour of production rent while taxing other sources of rent (the Chinese context).

Drozda (2023) has recently drawn attention to the aspect of the development of niche directions of agricultural production for given climatic zones (e.g., herbs, vineyards in Poland), which are undertaken by high-income residents, causing the gentrification of rural areas and thus a rent gap.

In contrast, a review by Boulay (2022) focused on the rent gap in rural areas concerning undeveloped land and housing rented to local workers rather than to tourists or new residents despite rising touristic/residential potential of the area (the French context).

Lehn and Bahrs (2018) identified the increase in livestock production in Germany as one of the main causes of rising land prices (along with urban development). The market competition created enormous pressure on farmers who were standing precariously at the limit of profitability. In effect, the rent-seeking translated into higher economic performance in livestock production.

Zhang et al. (2021) assessed the impact of the growing rent gap on labour productivity in rural China. They found that rising land prices and the rent gap caused an increase in labour productivity of 55%.

The single paper that empirically tests the effects of the rent gap in agriculture is the article by Ji et al. (2020), who show that uncoordinated population and land urbanisation lower land use efficiency.

In the light of the above, the aim of this article is three-fold:

- to integrate the development of the rent gap theory into the ground rent theory, proving that in the neoclassical approach there is no place for a rent gap to occur;
- to make a classification of potential farmers' reactions to the rent gap within different farming conditions; we believe that such systematisation of the effects of the rent gap fills a knowledge gap, as previous studies explain the rent gap in terms of particular farming conditions;
- on the empirical side, to determine the level and dynamics of the rent gap in agriculture in various regions of Polish, testing the hypothesis about the durability of the rent gap in European conditions.

The rest of the article is organised as follows: the next section presents the literature discussion about integrating the notion of the rent gap into the ground rent theory; potential farmers' reactions to the rent gap are identified. Then, the level and dynamics of the land rent gap in Polish agriculture are calculated for various regions. Finally, broader implications of the rent gap for food security and environmental policies are discussed and some recommendations for policymakers are formulated.

2. Conceptual framework for integrating the rent gap with the ground rent theory

2.1. Rent gap in the context of modern ground rent theories

By definition, an economic rent is excess income over and above the income that induces the factor of production to provide services. However, the sources of this income are debatable. In mainstream economics, shortages of land supply create inelastic supply rents (de facto quasi-monopoly rents) and the productivity and utility of a given plot of land generates additional differential rents. Thus, land is no different from other commodities. The question then is whether land has some unique features that justify a distinct theorisation (Ward & Aalbers, 2016). According to Blaug (1985), the answer is no, because land is no different from capital (see Blaug, 1985: 79–83; cf., Clark, 1988: 32–52).

Nevertheless, modern rent theories raise the problem of uncertainty about future land use and its value over time (Neutze, 1987). In contrast, Harvey (1982, 2006) argues that the land rent plays a key role in the process of capital accumulation and spatial coordination of capital flows, encouraging landowners to increase land productivity and capture differential rents. The focus has thus shifted to examining the process of transforming land into financial assets (Haila, 1990).

Looking for a consensus on the above approaches, one can accept the neoclassical perspective, i.e. the determination of the value of rent through inelastic land supply and differential rents (financialisation of land), but within an institutional context that limits the rationality of the demand and supply sides. Institutional conditions are created by the state, legal regulation of the land market, socio-cultural norms, as well as economic policy.

From the point of view of the rent gap in metropolitan settings, it can therefore be assumed that the inelastic supply of land in locations close to the centre creates an increasing quasi-monopoly rent. On the other hand, the potential land rent does not automatically become an equilibrium price, due to institutional liquidity constraints in the real-estate market. These constraints relate to the protection of specific social groups and their civil rights, as well as the safeguarding of cultural heritage. Barriers to liquidity may also be behavioural in nature; they may be related to local traditions and culture that shape attitudes to property ownership or a systemic path-dependency. Thus, if it were not for the above institutional context, which limits rationality to some extent, the rent gap would not exist (Bourassa, 1993; Clark, 1995). This context is nonetheless evident, especially in the face of post-communist or peasantry path-dependency.

It is therefore worth emphasising that the rent gap theory is only applicable to certain concepts of land rent. Ricardian theories and orthodox marginalist approaches do not assume the existence of the rent gap. Its existence is only explained by the Marxist context of absolute (monopoly) rents and currently by the heterodox context of institutional economics.

2.2. Causes of the rent gap in agriculture

Rural functions are changing as a result of many overlapping processes, including in particular: the urbanisation of peri-urban areas mentioned in the introduction and the development of rural tourism; land acquisition for renewable energy investments, tradable permit systems for environmental amenities such as habitat banking, and in the future also carbon sinks following the introduction of certification for carbon capture and storage; hunger for agricultural land in areas of intensive agriculture with a large surplus of demand resulting in purchases, regardless of the production values; the development of new niche agricultural production in the area (e.g., vineyards in Poland) (Drozda, 2023); land grabbing as a result of the increasing global struggle for access to key resources; land abandonment as a result of ageing of the rural population and lack of succession, especially under the conditions of a fragmented agrarian structure. All of the above-mentioned processes except the last one lead to some forms of gentrification of rural areas, in the sense of an influx of people with higher property status and/or capital. These processes result in demand for new agricultural land utilities. As a result, the share of typically productive utilities discounted in the price of agricultural land is declining in favour of other amenities.

This phenomenon has been observed and studied by many authors, such as Wasson et al. (2013), who calculated that the attributes of a plot of land, which include its recreational and environmental amenities, account in the US for between 5% and 60% of the land value. In contrast, Delbecq et al. (2014) argue that the agricultural return rate will decline in favour of non-agricultural sources that

also contribute to land prices. A number of papers note that the correlation between agricultural land prices and rental prices is becoming weaker and that both values are becoming detached (O'Neill & Hanrahan, 2016; Ciaian et al., 2021; Baldoni et al., 2023). Still, the approach to the value of land as a discounted rent stream is valid. The income approach originated from the work of Turgot (1770), then Fisher (1908) and the Austrian School. Today, the income approach (present value PV models) is one of the most frequently used methods to model land prices (Weersink et al., 1999; Goodwin et al., 2003; Borchers et al., 2014; Ciaian et al., 2021; Baldoni et al., 2023).

As economic rent denotes surplus income beyond what is required to motivate labour to offer services, the approximation of land rent will be either rent or the surplus from agricultural operations (obtained after the remuneration of all factors of production, including farmers' own labour). The land rent understood in this this way is discounted in the price of the resource, i.e. agricultural land. However, if the PV discounted in this way is lower than the market price of the land, then we have a rent gap, which means that the potential rents discounted by the land market are higher for some reason. As mentioned above, the price of land discounts an ever-widening range of non-agricultural utilities, and agricultural policy payments are capitalised on land prices (we will return to this thread in a moment).

Such a situation is problematic for farmer-landowners, and its implications are described in the theorem of the farmland market treadmill (Levins & Cochrane, 1996). Although agricultural land is not depreciable like other real estate, it also requires continuous inputs to keep agricultural production competitive and profitable. These inputs are incurred in implementing progress and increasing economies of scale. This is due to the constant pressure to increase productivity (called the "market treadmill" by Cochrane, 1958, 1979), which forces farmers to implement new technologies and increase the scale of production. If these measures are not implemented because, for example, land is too expensive to buy, the profitability of agricultural production falls and becomes negative over time. In other words, the operating surplus in agriculture should be sufficient to create a "fund" for investment in land. If this does not happen, then the farmer becomes a "laggard", and the land falls out of agricultural production. However, in small-scale farming, which quite often is semi-subsistence, farmers can continue agricultural activities despite unprofitable production. This phenomenon, originally observed by Czajanow (1966), has survived to some extent to this day (Czyżewski & Kryszak, 2023; Davidova et al., 2012), and in the EU is especially present in the countries of Central and Eastern Europe. Small farms (called peasant farms) usually do not maximise profit but optimise income per family member and leisure to meet basic family needs.

Thus, when there is a rent gap, i.e. the difference between the current operating surplus (or rental price) and the potential rent discounted in land prices, the farmer must either increase efficiency to bridge the gap, or accept the gradual relative deprivation of agricultural income, or sell the land. These scenarios are depicted in Fig. 1 in reference to the explanation of the "temporality" of the rent gap phenomenon under metropolitan conditions (Clark, 1995).

However, the land market treadmill concept does not explain the reasons for the agricultural rent gap, i.e. why the value of land "escapes" from the operating surplus or rental price. These reasons are complex and make closing the gap through efficiency gains very difficult. So where does the agricultural rent gap come from? It has several key causes.

First of all, the non-agricultural utilities that agricultural land gains, as well as CAP subsidies, capitalise unevenly (i.e., disproportionately or not at all) in land prices and rents. Regarding agricultural policy subsidies, Baldoni and Ciaian (2023) estimated that the capitalisation rate in the short term is 9.1–46.2% for land rent (11% and 55%, respectively, in the long term) and 28.8–32.1% for land market value (154% and 164%, respectively, in the long term). That is, the capitalisation in land prices is much greater than the capitalisation in rental prices, which widens the rent gap. As for non-agricultural amenities, these are not reflected at all in the data of GUS (Statistics Poland) and EUROSTAT (Table 1), as these figures are for agricultural purposes only. However, it is well known that annual rental offers for a photovoltaic farm currently fluctuate around PLN 15,000 per ha (Zieniewicz, 2023), although much of this amount is, in a sense, compensation for the cost of land reclamation in the future. Although there are no legal restrictions on the leasing of land in Poland, the market for non-agricultural leases is in its infancy. There are also no functioning systems of tradable permits for high nature-value land, e.g. along the lines of the US Conservation Reserve Programme CRP or habitat banking (Czyżewski & Kryszak, 2022). Such schemes could create a quasi-market value for environmental amenities that would be capitalised on land rent and operating surplus. Perhaps this

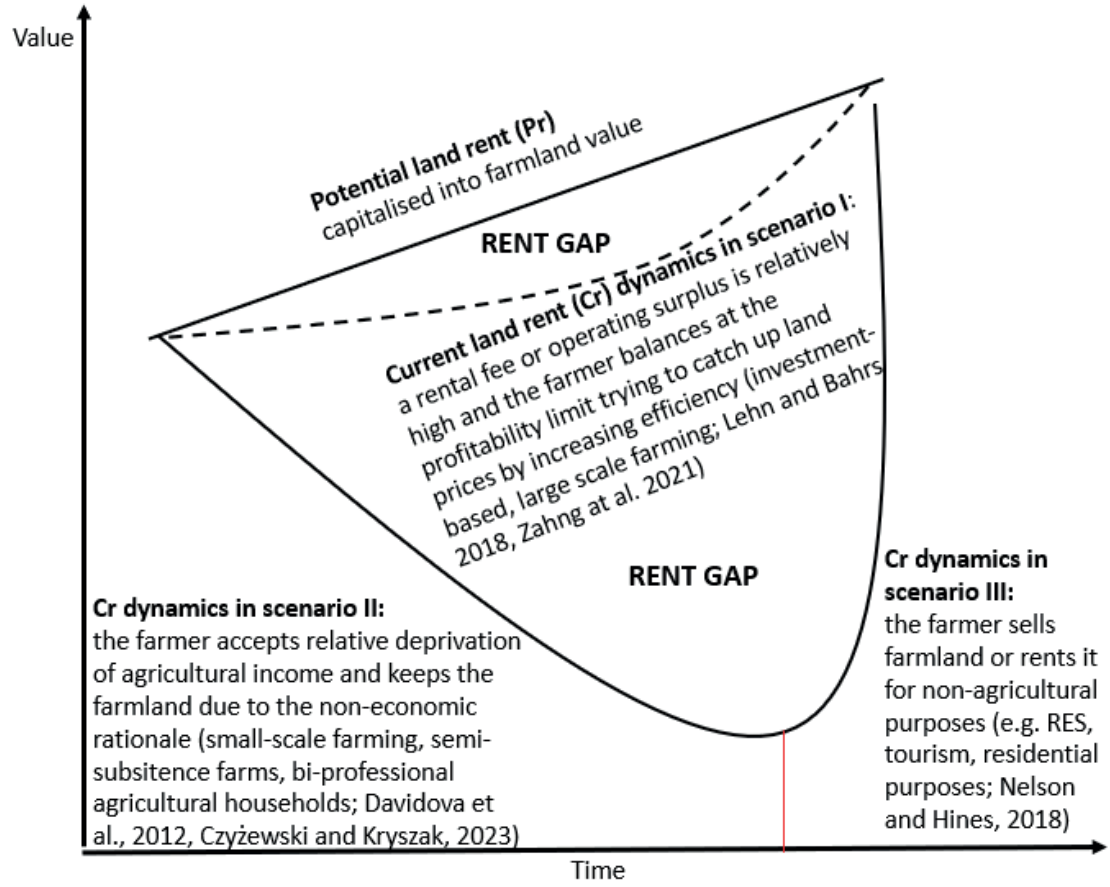

Fig. 1. Farmers' potential responses to rent gap in agriculture in different farming conditions
Source: own elaboration

situation will change once certification for carbon capture and storage is introduced (EC COM[2022] 672 final, 2022/0394 [COD], 30.11.2022).

The second reason for the rent gap is the system of leasing state land from the WRSP stock (Agricultural Property Stock of the State Treasury), which distorts the privately traded rental market. Although the rental price of state land is linked to average wheat prices, it is below market rental prices because it does not take into account the rents of inelastic land supply.

Another rationale for the rent gap is the lack of consistency in the enforcement of the Single Area Payment Scheme (SAPS) rules, where payments should go to the land user. In reality, they often go to the landowner, as a result of which the landowner accepts a lower rent. This, in turn, results in a blurred picture of the rental market.

At the same time, there are a number of premises that hinder or delay the bridging of the rent gap or even maintain it in the long run (which means that the time limit indicated by the red line in Figure 1 is scarcely defined). There are behavioural and cognitive factors or a systemic path-dependency that constrain rationality. Farmers can be emotionally attached to their land and see it as a determinant of the farm's resilience and asset status. As a result, they have a dual perception of the value of land, i.e. from a short-term and long-term perspective. In the short term, they are prepared to rent land below the potential rent, as they hope to cushion the rent gap in land value in the long term. In this way, a kind of dual equilibrium price is formed in the market. A significant barrier to closing the rent gap through the de-agrarisation and subsequent sale or lease of land is the long and unclear administrative procedures involved.

3. Research method: a proposal for measuring the agricultural rent gap

It has been assumed, in line with mainstream economics, that land is subject to increasing financialisation and is a form of capital and that,

thus, the approach to risk assessment used in capital markets should be adopted. Consequently, this is relevant in determining the discount rate for agricultural land in an income approach (Trugman, 2016). The rent gap can manifest a different durability, and current rent (capitalised rent) may differ according to institutional and behavioural constraints, as depicted in Figure 1. Nevertheless, the income approach offers a consistent way to estimate the value of potential rent.

According to Tegova (2020), the income approach is utilised in the assessment of various properties, determining their value by capitalising or discounting the projected future income derived from the property. The income in this case can be in the form of rent from agricultural land. A traditional income growth model, known as the "capitalisation method", including direct capitalisation, has been used. Direct capitalisation is employed using the following formula: the capital value is equal to the net operating income divided by the capitalisation rate. In our study, we can write:

$$MV = \frac{Income}{Cap}$$

where: *MV* is based on land market prices, Income is based on potential annual rent, and *Cap* is the capitalisation rate (equal to discount rate in the CAPM approach).

The capitalisation rate, also known as the all-risks yield, reflects – according to Tegova – all of the market's perceived expectations regarding risks, anticipated positive benefits and other investor expectations. Hence, it can be seen as the discount rate in the CAPM approach. This rate encompasses the market's outlook on potential rental and/or capital growth of the property. Higher-quality and better-located properties are associated with lower perceived risks, making investors more inclined to purchase at a reduced capitalisation rate/discount rate (Tegova, 2020).

In estimating the capitalisation rate (equal to the discount rate in this case), we used the CAPM model (Skorupski, 2023), with the risk premium estimated by Damodaran (2023):

$$rd = rb + \beta\,(rm - rb)$$

where: *rd* – discount rate, *rb* – base risk, β – unlevered Beta, *rm* – market risk, and (*rm* - *rb*) equals risk premium for a country ERP.

The base risk (*rb*) was calculated using the average annual yield on ten-year government bonds adjusted for inflation (CPI) and capital income tax according to the formula:

$$r_b = \left[\frac{(1 + s \cdot 0{,}81)}{(1 + i)}\right] - 1$$

Since the r_b was found to be below or equal to the safe margin (in 2017 and 2019–2022), we utilised the safe margin for bond interest, set at 1.3% net above the inflation rate. We derived the real risk-free rate from ten-year savings government bonds issued under the Letters of Issue of the Minister of Finance, available through the retail sales network. The base risk for these bonds was computed with a fixed margin of 1.30% to 2.8% during the period 2013–2022 in Poland, following the concept outlined in the McKinsey valuation textbook by Koller and others (2020). Real interest rates on government bonds are expected to remain non-negative, even during periods of high inflation, as investors anticipate inflation returning to long-term levels. Therefore, recommendations from McKinsey and CFA Institute (2020) advise taking a cautious approach to the real risk-free rate, considering long-term inflation rather than short-term fluctuations. This is especially relevant given the ten-year maturity of the bonds. Consequently, a fixed margin may be applied in Poland for this purpose.

Risk premium assessment refers to the rating-based default spread, risk premium for a mature equity market, and volatility multiplier for emerging markets, following Damodaran's (2023) approach.

When it comes to Beta, we assume that farmers are risk averse and stay in the position of landowners conducting rental operations. Thus, the average unleveraged Beta for the real-estate (operations/services) sector in Europe was applied. Betas are adjusted to reflect a company's total exposure to risk rather than just the market risk component. It is a function of the market beta and the portion of the total risk that is market risk. These betas might provide better estimates of costs of equity for undiversified owners of private businesses (Damodaran, 2023a)

Potential rent (Pr) was derived from the present value model: L = R/rd, where L – land market price, R – potential annual rent.

Current rent (Cr) was proxied by arable land rental prices in private turnover (for agricultural purposes only).

The risk assessment described above involves an analysis of the real non-agricultural options for farmers in Poland. Their real non-agricultural opportunities are as follows: a) long-term lease for a photovoltaic farm; b) de-agrarisation of land

(classes IV–VI) and sale for residential purposes; c) unrestricted sale for residential purposes within the administrative boundaries of cities; d) construction of holiday homes in areas attractive for tourism and/or agritourism and short-term rental; e) future opportunities related to the carbon dioxide removal certification mechanism proposed in 2022 by the EC (COM(2022) 672 final, 2022/0394 (COD) 30.11.2022).

4. Results

Table 1 shows the calculation of the agricultural rent gap in Poland in the cross-section of voivodeships in 2022. The results show several voivodeships with a different level of the agricultural rent gap. The Podlaskie voivodeship clearly stands out from the rest, followed by the Łódzkie, Warmińsko-Mazurskie, Opolskie, Śląskie and Małopolskie voivodeships, which all have a similar rent gap level. On the basis of the conducted research, it can be concluded that the level of the rent gap is a resultant of four factors: the fragmentation of agricultural land, tourism attractiveness, urban fringe pressure and the share of state-owned land from the Agricultural Property Stock of the State Treasury (WRSP). The Podlaskie, Warmińsko-Mazurskie, Śląskie and Małopolskie voivodeships are at the same time characterised by a very small average area of farms and high tourist attractiveness. Furthermore, the Łódzkie voivodeship has one of the smallest average areas of farms in Poland and there is relatively high pressure from metropolitan areas. The Opolskie voivodeship is distinguished by a large share of land from the WRSP (which reduces rental prices in private turnover) and at the same time fairly high tourist attractiveness.

In turn, Table 2 and Figure 2 show the rent gap in dynamic terms for the period 2013–2022. The last decade was dominated by a downward trend in the rent gap in Poland, from 2015 to 2021. This may be attributed to several factors, with a decrease in the risk premium (whose genesis is multidimensional, both domestic and global) and a decline in the underlying risk (mainly due to inflation) being of great importance in this regard. As a result, the discount rate (opportunity cost) had been decreasing until 2021. In 2022, there was a sudden increase in the risk premium in Poland due

Table 1. Agricultural rent gap and its components in Polish voivodeships (in PLN per ha, 2022)

Voivodeships	Arable land price	Base risk	Risk premium	Unleveraged Beta (Europe)	Discount rate (CAPM)	Potential rent (Pr)	Current rent (Cr)	Rent gap (in % of Cr)
Podlaskie	62, 528					**2,664**	**652**	308.5%
Łódzkie	51,256					**2,184**	**870**	151.0%
Warminsko-Mazurskie	55,566					**2,367**	**1,051**	125.2%
Śląskie	45,059					**1,920**	**864**	122.2%
Opolskie	58,945					**2,511**	**1,136**	121.0%
Małopolskie	47,152					**2,009**	**917**	119.0%
Pomorskie	52,158					**2,222**	**1,069**	107.9%
Mazowieckie	53,472					**2,278**	**1,096**	107.8%
Lubelskie	48,508	1.30%	7.40%	0.4	0.0426	**2,066**	**1,098**	88.2%
Podkarpackie	36,329					**1,548**	**857**	80.6%
Lubuskie	36,403					**1,551**	**861**	80.1%
Dolnośląskie	44,309					**1,888**	**1,062**	77.7%
Wielkopolskie	78,016					**3,323**	**1,926**	72.6%
Świętokrzyskie	39,937					**1,701**	**1,129**	50.7%
Zachodniopomorskie	33,792					**1,440**	**980**	46.9%
Kujawsko-Pomorskie	65,884					**2,807**	**2,028**	38.4%
POLAND	59,387					**2,530**	**1,502**	68.4%

Notes: see methodological remarks in Section 3
Source: own calculations based on data from Statistics Poland (GUS), 2023; EUROSTAT, 2023; Tygodnik Poradnik Rolniczy, 2023; Damodaran, 2023

Table 2. Changes in the agricultural rent gap and its components in Poland (in PLN per ha, 2013–2022)

Year	Arable land price	Base risk*	Risk premium*	Unleveraged Beta (Europe)*	Discount rate (CAPM)*	Potential rent (Pr)*	Current rent (Cr)*	Rent gap (in % of Cr)
2013	26,339	0.026	0.063	0.307	0.045	1,192	718	66.0%
2014	32,317	0.028	0.070	0.387	0.056	1,800	908	98.2%
2015	38,579	0.022	0.076	0.406	0.053	2,036	906	124.7%
2016	39,631	0.025	0.069	0.361	0.050	1,980	952	108.0%
2017	41,287	0.013	0.061	0.409	0.038	1,559	1,023	52.4%
2018	44,381	0.015	0.071	0.370	0.041	1,827	1,134	61.1%
2019	47,233	0.013	0.060	0.317	0.032	1,517	1,284	18.2%
2020	47,589	0.013	0.055	0.359	0.033	1,565	1,219	28.4%
2021	49,929	0.013	0.051	0.414	0.034	1,700	1,304	30.3%
2022	59,387	0.013	0.074	0.400	0.043	2,530	1,502	68.4%

Notes: see methodological remarks in Section 3
Source: as for Table 1

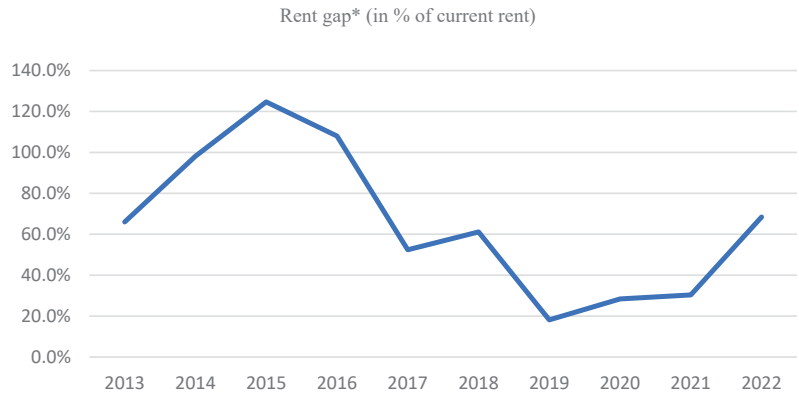

Fig. 1. Changes in the agricultural rent gap in Poland (2013–2022)
Source: as for Table 1
*see notes for Table 1

to the outbreak of war in Ukraine. This shows that the rent gap was permanent and largely determined by macro-economic factors, which coincides with findings from other studies. For example, Weber and Key (2014) highlighted that land and rental prices depend primarily on the level of interest rates, inflation and economic growth in metropolitan areas.

5. Implications of the rent gap in agriculture

The implications of the agricultural rent gap concern various dimensions. In economic terms, a persistent rent gap promotes the gentrification of rural areas, where capital flows in through various channels: through investment in renewable energy sources, tourism infrastructure and residential real estate. This entails the development of the service and commercial sectors, more revenue for local government budgets and, consequently, increased spending on transport infrastructure and education. Gentrification of rural areas therefore means faster economic development.

At the same time, gentrification can be environmentally beneficial in some aspects. The influx of a wealthier population usually means diffusion of pro-environmental attitudes and lifestyles, which reduces emissions, together with investments in renewable energy sources.

On the other hand, there is increasing pressure on environmental public goods within the expanding urban fringe. In particular, biodiversity associated with wild woodland and agricultural landscape habitats is threatened.

The negative consequences are also related to the issue of food security, especially in the global aspect. The reduction in food production is a major trade-off of the broadening spectrum of agricultural land use and a widening rent gap.

In the context of economic policy, the agricultural rent gap creates favourable conditions for the implementation of quasi-market mechanisms for the valorisation of public goods (tradable permits), such as high nature value site selection, habitat banking as well as carbon sink (Santos et al., 2011; Klassert & Möckel, 2013). Such solutions are promising because, as noted above, the rent gap is largely related to farmers' reluctance to change the existing land use. It often occurs that a farmer does not want to take land with a relatively low production value out of agricultural use by selling it or renting it for non-agricultural purposes, despite the growing rent gap. The resilience of farms, especially small and medium-sized ones, can often be irrational. However, low production values can go hand in hand with environmental values (public goods), such as carbon capture and storage capacity. The idea, however, is to create a quasi-market for environmental amenities while capitalising the value of the public goods into the income of the landowner. An example for this may be the planned EC certification for carbon capture and storage (EC COM[2022] 672 final, 2022/0394 [COD] 30.11.2022).

However, such activities should be offset by support for basic food production, especially in terms of enabling farmland purchases and concentration of land. This could be a system of concessional loans for the purchase of agricultural land for production purposes or the sale of land from the WRSP subject to conditions. The gap could also be closed indirectly by supporting efficiency-enhancing investments, as well as through coupled payments.

6. Conclusions

In countries where the capitalist economy has operated unhindered for a long time, the rent gap theory can be used to strip away the populist policy rhetoric that exposes the underlying social inequality and class conflict inherent in gentrification, especially in rural areas. However, where there remains a strong legacy of systemic transition, i.e. path dependency of peasantry or communism, the rent gap theory requires further research and empirical confirmation of stakeholder responses to the rent gap occurrence and explanation of the reasons for the long-term persistence of this phenomenon. This article indicates what scenarios of farmer behaviour in response to the rent gap should be studied.

In addition, the agricultural rent gap links urban and rural contexts. In-depth studies of the effects of the agricultural rent gap can shed more light on the links between the financial and productive aspects of the land rent, e.g. by estimating the effect of the rent gap on farming efficiency and total factor productivity in agriculture in the long run. This type of analysis is another line of research that can make an important contribution to the discussion on the trade-offs between the need to reduce GHG emissions and the challenge of doubling global food production by 2050. With regard to agricultural policy, the concept of the rent gap suggests its evolution towards a two-track support for agriculture that, on the one hand, uses the rent gap as a catalyst for the quasi-market valorisation of public goods and, on the other hand, supports agricultural production on the most fertile soils, accelerating the process of land consolidation.

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