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Economic Comment

The flood has (slightly) undermined consumption

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In the second half of September, Poland suffered due to flood. Impact of this natural disaster on the economy is complex and transmitted through multiple channels. We have decided to investigate a small part of this problem by estimating the flood's impact on current consumption of households.

We conducted our analysis based on September card spending data of Santander's customers. We assumed that the impact of the flood on current consumption expenditure is realised through several channels: the flood made shopping difficult due to the destruction of infrastructure, including shops and access roads, changed consumer preferences (e.g. redirected their attention to fighting the effects of the flood, it could have encouraged additional purchases of basic necessities for precautionary reasons, discouraged tourists) and caused a decrease in the number of consumers (as some were evacuated). We collected daily data taking into account the locations of the stores where the transactions were made and compared September 2024 to September 2023.

Our results suggest that although the impact of the flood on individual towns or even powiaty (middle-level units of local government) was significant and caused a decrease in expenditure by up to several dozen percent, on a national scale this effect was insignificant – in our opinion, domestic consumption on average may have decreased in September by about 0.0-0.5% compared to the counterfactual scenario without the flooding (although we would rather say the effect was more likely to be closer to 0.0% than to 0.5%). This is not enough to consider correcting the forecasts for retail sales or private consumption.

Since at the end of September the level of expenditure was still reduced in many powiaty, it can be assumed that the negative effect will also be carried over to October. However, in the longer term, there may be positive consumption effects, resulting primarily from the reconstruction, purchases of construction materials and durable goods. There will also be a positive, spread over time, impact of the reconstruction of flood losses on investments.

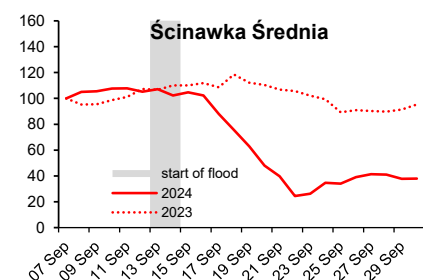
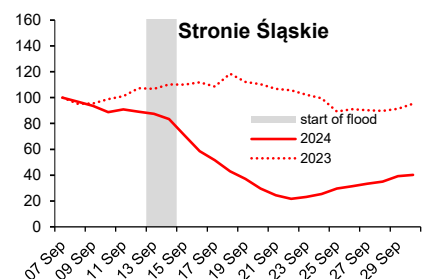
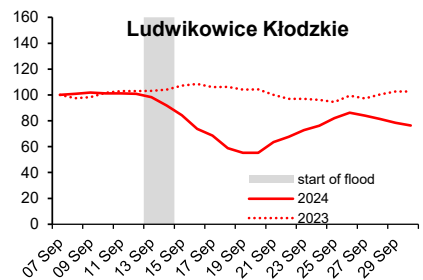
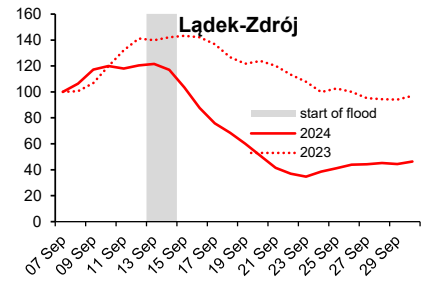
In September this year, as a result of heavy rains, the water level in rivers in south-western Poland increased and floods occurred. The first flooding in the populated areas occurred on the night of 13 to 14 September, and in the following days the flood wave passed through other towns. On 16 September, a state of natural disaster was declared in selected areas, and in the following days its range was expanded.

Based on the card spending data of Santander's customers, we estimated the impact of this phenomenon on current consumption in September. We assumed that the impact of the flood on current consumption expenditure is realised through several channels: the flood made shopping difficult due to the destruction of infrastructure, including shops and access roads, changed consumer preferences (e.g. redirected their attention to fighting the effects of the flood, it could have encouraged additional purchases of basic necessities for precautionary reasons, discouraged tourists) and caused a decrease in the number of consumers (some were evacuated). We collected daily data taking into account the locations of the stores where the transactions were made and compared September 2024 to September 2023.

Strong decline of spending in particular towns ...

The decline in shopping activity was clear in the case of towns such as Stronie Śląskie or Łądek-Zdrój. On the worst days, it was even 70-80% lower than the average before the flood. On a monthly basis, we estimate that the value of card transactions in these places will be up to 20-50% lower than in the scenario without the flooding. A similar scale of decline was observed in

Card spending in smaller towns affected by the flood, weekly moving average, first week of September = 100



Source: Santander

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several other localities, including Lewin Kłodzki, Ludwikowice Kłodzkie, Niemcza, Ołtrzychowice Kłodzkie, Srebrna Góra, Ścinawka Średnia and Walim.

However, not all flooded towns recorded such strong declines. For example, in Głuchotązy, Kłodzko or Prudnik, in the worst moments declines reached 20%, and the whole month can be estimated at minus 0-10%. These towns are clearly larger than those mentioned in the previous paragraph – over 20 thousand people live in Kłodzko and Prudnik, a bit below 15 thousand in Głuchotązy, and less than 6 thousand in Stronie Śląskie – the most populated one among towns mentioned in the previous paragraph.

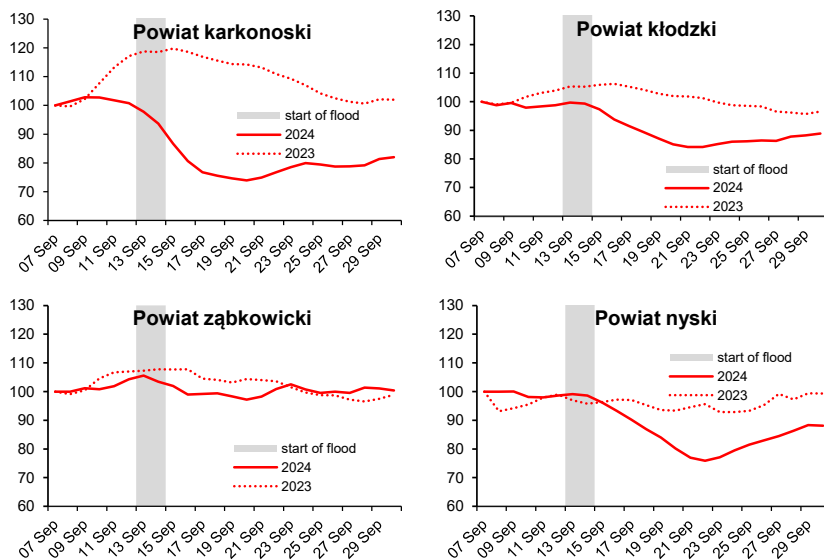
In our opinion, the explanation for such large differences between individual towns is twofold. Firstly, exposure to tourism – the flood not only destroyed tourist resorts or access routes, but also scared off potential holidaymakers. Clear decreases were thus also recorded in towns that did not suffer directly from the flood, but which are located close to flooded areas, e.g. Karpacz, Kudowa-Zdrój or Szklarska Poręba. Our analysis shows that spending on hotels in these three cities fell by about 20-30% in September as compared to a no-flood scenario.

Secondly, the size of the town – due to the larger area, more populated towns may be characterised by greater variability of the terrain, greater diversification of economic activity, as well as a higher average height of buildings. As a result, we would generally expect fewer extreme outcomes in larger towns than in smaller ones.

... and less visible at the powiat level, yet still significant

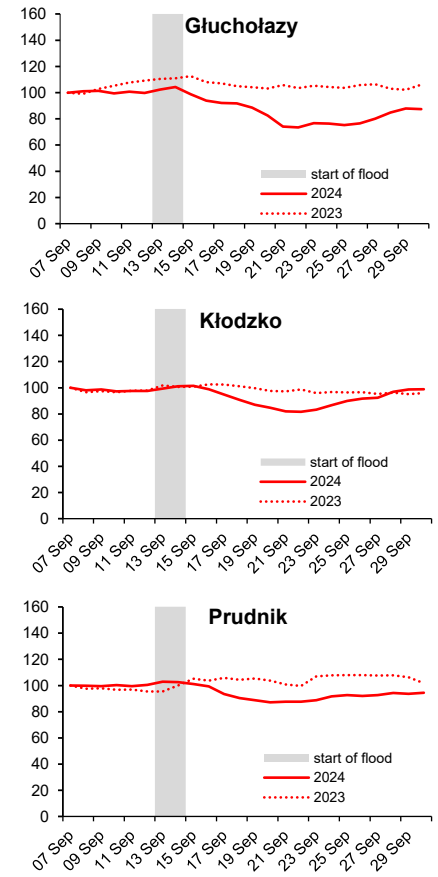
At the level of powiats, which are middle-level administrative units in Poland (bigger than gmina, smaller than voivodeship, there are 380 powiats in total), the flood effect becomes less visible. Out of 32 powiats with declared state of natural disaster until 25 September (18 in the Dolnośląskie Voivodeship, 7 in the Opolskie Voivodeship, 5 in the Śląskie Voivodeship), by far the strongest decline was recorded in Karkonoski Powiat, which saw its card spending decline by 20% in September. Decreases by about 10% were recorded in the powiats: Bielski, Cieszyński, Kłodzki and Nyski. In others, the declines were less pronounced, or even expenses have increased. We estimate the average decrease in expenditure in powiats with declared state of natural disaster at c. 4.5% for the whole month. On the scale of the whole country – after weighing the powiats based on their population (slightly below 8% of the country's population lives in powiats affected) – the effect should be estimated at 0.3-0.4%.

Card spending in powiats affected by the flood, weekly moving average, first week of September = 100



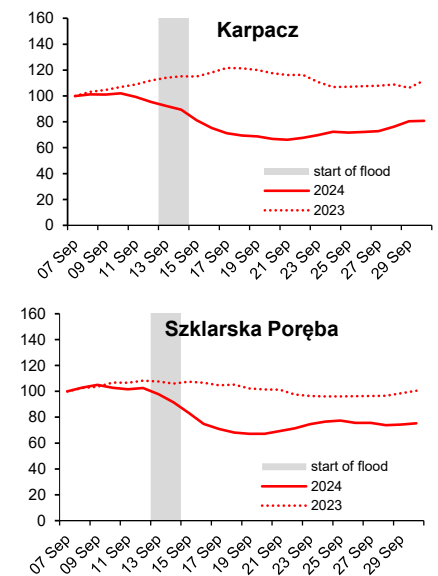
Source: Santander

Card spending in bigger towns affected by the flood, weekly moving average, first week of September = 100



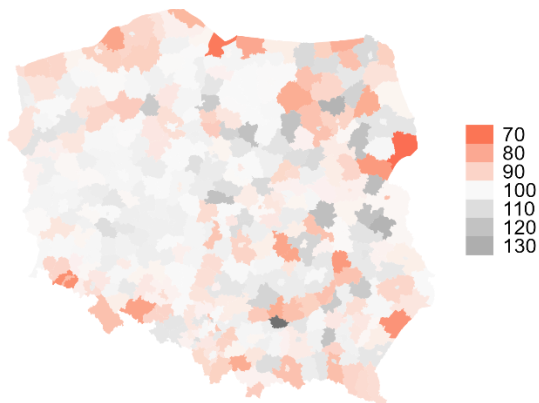
Source: Santander

Card spending in selected towns not affected by the flood, weekly moving average, first week of September = 100



Source: Santander

Card spending in powiats during 15-28 September 2024 in relation to card spending during 1-14 September 2024, comparison with a corresponding statistic for 2023



Values below 100 mean that card spending in the second half of September 2024 decreased more strongly (or rose less strongly) from their level in the first half of September than they had in the corresponding period of 2023.

Source: Santander, GUGiK

To make sure that the decrease in expenses we saw in the data was caused by the flood, and not by other factors, we have conducted a deeper statistical analysis. We have built econometric models in which we compared the average expenditure in the 15-28 September period to the average expenditure in the 1-14 September period for 2023 and 2024. We assumed that the scale of the flood's impact on expenditure could vary between powiats depending on when they were covered by the natural disaster state. As the days passed, the flood wave was losing its strength, and there was more time for preparations, so we expect weaker effects in the powiats where the state of disaster was introduced later. We also took into account the fact that in September 2024, spending across the country could have looked differently than in September 2023, due to, for example, a change in the economic situation or weather effects.

The flood effects identified in this way are negative for all the analysed groups of powiats, but their scale is statistically significant only for the powiats that were covered by the state of natural disaster first, i.e. on 16 September (16 powiats). In their case, the impact of the flood on expenditure in the analysed period is estimated at about -3.8% (compared to expenditure in 1-14 September).

What is more, most of the negative impact on card expenditure in these powiats took place in the third week of September, i.e. in the first week of floods. The flood impact coefficient estimated only for this period is about -6.2% (and its statistical significance is additionally higher). The impact estimated only for the fourth week of the month turns out to be insignificant for all the analysed groups of powiats.

Impact of flood on Santander bank's clients' card spending in 15-28 September as compared to 1-14 September, by powiat groups

| Powiat group | Coefficient on the flood's effect, % | Coefficient's standard deviation | Probability that flood did not affect spending (p-value) |
|------------------------------------|--------------------------------------|----------------------------------|--|
| natural disaster declared 16.09 | -3.84 | 1.75 | 0.03 |
| natural disaster declared 17.09 | -1.98 | 2.61 | 0.45 |
| natural disaster declared 20-25.09 | -0.28 | 2.31 | 0.90 |

At the national level, the effect is slightly negative, but rather negligible

After taking into account the population of the surveyed powiats, the above results suggest that nationwide, expenditure in the period from 15 to 28 September could have decreased by about 0.2% compared to the first half of the month - both taking into account all powiats and only taking into account those for which the results turned out to be statistically significant (the difference is about 4 hundredths of a percentage point). This means that for the whole September, the scale of the reduction in expenditure due to flooding could be only 0.1%, which is slightly less than it would appear based on a simple comparison of average expenditures in 2023 and 2024 in powiats at risk of flooding (0.3-0.4%). This means that part of the recorded decrease in expenditure may have been caused by factors unrelated to the flood.

Powiats

Natural disaster declared on 16 September ...

... in the Dolnośląskie Voivodeship:

Kamiennogórski

karkonoski

ktodzki

lwówecki

walbrzyski

ząbkowicki

Wałbrzych

Jelenia Góra

Natural disaster declared on 16 September ...

... in the Opolskie Voivodeship:

głubczycki

Nyski

prudnicki

Natural disaster declared on 16 September ...

... in the Śląskie Voivodeship:

Bielski

cieszyński

pszczyński

raciborski

Bielsko-Biała

Natural disaster declared on 17 September ...

... in the Dolnośląskie Voivodeship:

dzierżoniowski

lubański

świdnicki

Natural disaster declared on 17 September ...

... in the Opolskie Voivodeship:

brzeski

kędzierzyńsko-kozielski

opolski

krapkowicki

Natural disaster declared on 20-25 September

...

... in the Dolnośląskie Voivodeship:

bolesławiecki

jaworski

legnicki

złotoryjski

otawski

wrocławski

Legnica

Natural disaster declared on 20-25 September

...

... in the Lubuskie Voivodeship:

żagański

Have the expenses moved to the safe powiats surrounding the flood zone?

We also checked whether the decrease in expenditure in the powiats affected by the flood was not accompanied by a simultaneous increase in neighbouring powiats not affected by the state of natural disaster. Such an increase in expenditure could be caused, for example, by stockpiling before the flood reached the area, or in order to help the victims. It could also result from the fact that in the powiats not affected by the flood, flood victims or evacuees could do their shopping. Taking this possibility into account in the model did indeed indicate a slight, positive effect in the surveyed powiats, but it was statistically insignificant.

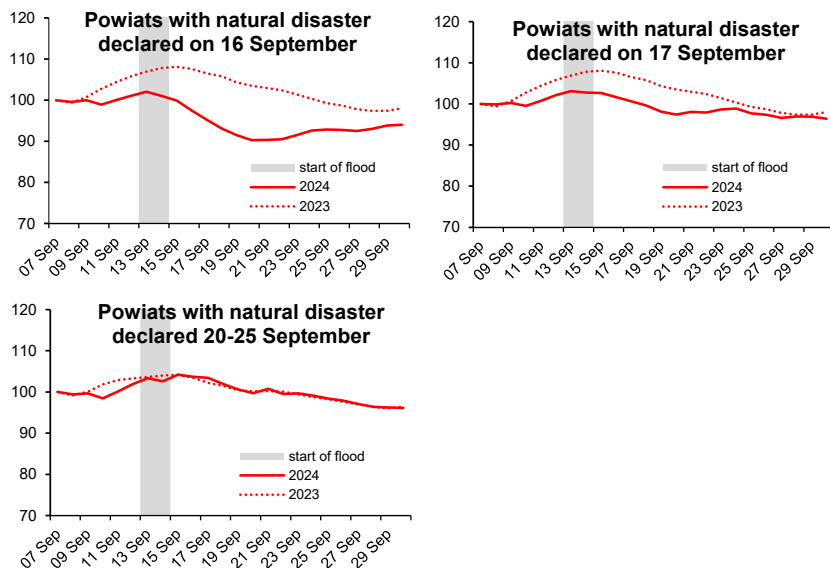
The flood also led to larger payments to charitable institutions. Our card data show that in the second and third week of September, such card payments were significantly higher (by 30-40% nationwide) than in the first week. However, we suspect that donations for these institutions are mainly made by other means than card payments, so it is difficult for us to assess the actual scale of the phenomenon using our data.

Summary

Our analysis of card spending in Poland in September shows that the flood had a negative impact on consumer purchases. This impact was particularly visible in smaller towns that suffered as a result of the flooding, as well as in tourist destinations located close to the flooded areas. The decrease in expenditure in the powiats where the state of natural disaster was officially declared amounted to several percent on average, and was the most visible in those administrative units where this state was declared the earliest. On the other hand, in terms of the whole country and the whole month, we estimate the strength of this effect – depending on the method adopted – at 0.1-0.4%, so at this level of generality it is negligible. It should be noted that card spending is not a perfect approximation of private consumption or retail sales: different types of spending may differ in the popularity of card use, so their weights in card transactions will not coincide with those in private consumption. In addition, expenses are classified according to the type of store, not the type of product/service purchased. In addition, it should be admitted that the flood could have increased the share of transactions made in cash. It is easy to imagine a situation in which the destruction of the power grid could simply prevent card transactions. Such a phenomenon would mean that we overestimate the negative effect.

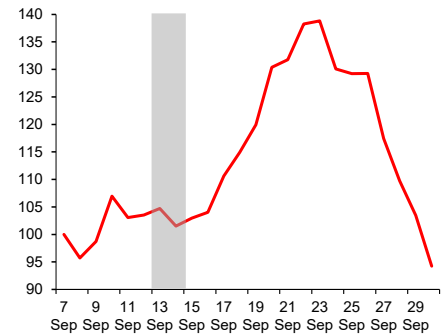
Therefore, we assume that it will be reasonable to estimate this negative impact more cautiously, at 0.0-0.5%, while stressing it will likely be smaller rather than larger within this range. Since at the end of September the level of expenditure was still reduced in many powiats, it can be assumed that the negative effect will also be carried over to October. However, in the longer term, there may be positive consumption effects, resulting primarily from the reconstruction, purchases of construction materials and durable goods. There will also be a positive, spread over time, impact of the reconstruction of flood losses on investments

Card spending in powiats affected by the flood, weekly moving average, first week of September = 100



Source: Santander

Card donations to charitable and social organisations, 7-day moving average, first week of September = 100



Source: Santander

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