Task 5 Report

1. Introduction and Research Question

In this report, we investigate the relationship between municipal-level income and political party support in Finland. The aim is to understand whether income levels influence the popularity of particular parties and how these dynamics differ between metropolitan and non-metropolitan areas. The task is framed as a broader research problem: given pre-prepared datasets on municipal income (2017) and electoral results from the parliamentary election of 2023, we explore the link between socio-economic status and political preferences.

This question is particularly relevant in the Finnish context, where the political landscape is divided between parties with strong roots in urban, wealthier regions and those drawing their support from rural areas or lower-income voters. For instance, the National Coalition Party (KOK) has traditionally appealed to higher-income groups, while the Centre Party (KESK) and the Finns Party (PS) are often associated with rural and working-class support. By linking income data with electoral outcomes, the report aims to test whether these associations hold true across municipalities.

2. Data and Methods

The analysis is based on two datasets. The first is a municipal-level income dataset from Statistics Finland for the year 2017. This dataset provides a range of indicators such as the total number of income earners, average and median incomes, wages and salaries, capital income, and taxes paid. Among these, the most central measure for our study is the average income (Tulot), which we use as a proxy for the economic prosperity of each municipality.

The second dataset contains the results of the 2023 Finnish parliamentary elections, also organized at the municipal level. It records the percentage of votes gained by each political party across municipalities, including both major and minor parties. Since many of the smaller parties have marginal support, the analysis focuses primarily on the established parties with significant representation: the Social Democrats (SDP), the Finns Party (PS), the National Coalition Party (KOK), the Centre Party (KESK), the Greens (VIHR), the Left Alliance (VAS), and the Swedish People's Party (RKP).

Before merging the two datasets, some cleaning was necessary. The income dataset contained an entry labeled "KOKO MAA," representing the entire country rather than a municipality. This was excluded to ensure comparability at the municipal level. In addition, a few very small municipalities from the Åland Islands and other regions did not have matching election data and were excluded automatically when filtering for cases where both income and election results were available. After cleaning, the merged dataset contained 293 municipalities.

To enable more nuanced comparisons, several derived variables were created. First, municipalities were classified into metropolitan and non-metropolitan categories. The metropolitan group was defined as the capital region—Helsinki, Espoo, Vantaa, and Kauniainen—while all other municipalities were coded as non-metropolitan. Second, income levels were divided into three categories—low, medium, and high—using tertiles of the income distribution. This categorization helps to compare political support across relative income strata rather than relying only on continuous income values.

We also identified the dominant party in each municipality, defined as the party with the highest vote share locally. This allows us to compare the socio-economic profiles of areas where different parties are strongest.

3. Visual Exploration

The first step in understanding the relationship between income and political preferences is to explore the data visually. To do this, we generated scatterplots, boxplots, and barplots that highlight how party support varies across different economic contexts and between metropolitan and non-metropolitan municipalities.
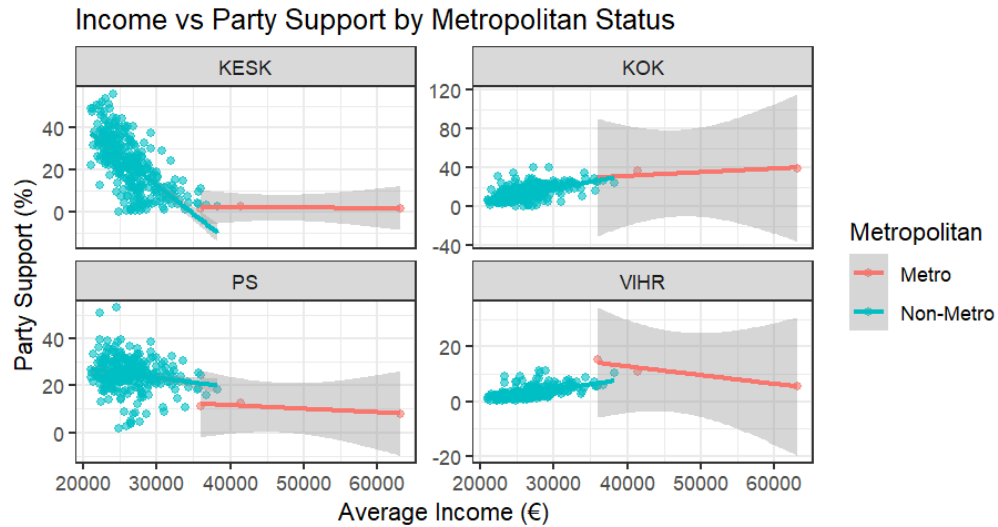
Figure 1

The scatterplots of income versus party support (Figure 1) reveal distinct patterns for the four largest parties—KOK, KESK, PS, and VIHR. The National Coalition Party (KOK) shows a strong positive relationship with income: support for KOK rises steadily as municipal income levels increase, especially in metropolitan areas such as Helsinki and Espoo. The Greens (VIHR) display a similar, though slightly weaker, upward trend with income. In contrast, the Centre Party (KESK) and the Finns Party (PS) are more popular in lower-income municipalities. KESK in particular has strong support in rural areas, where incomes tend to be below the national average. These scatterplots illustrate a clear socio-economic divide in Finnish politics, where right-leaning urban parties (KOK, VIHR) perform better in wealthier municipalities, while populist and agrarian parties (PS, KESK) dominate in less affluent regions.
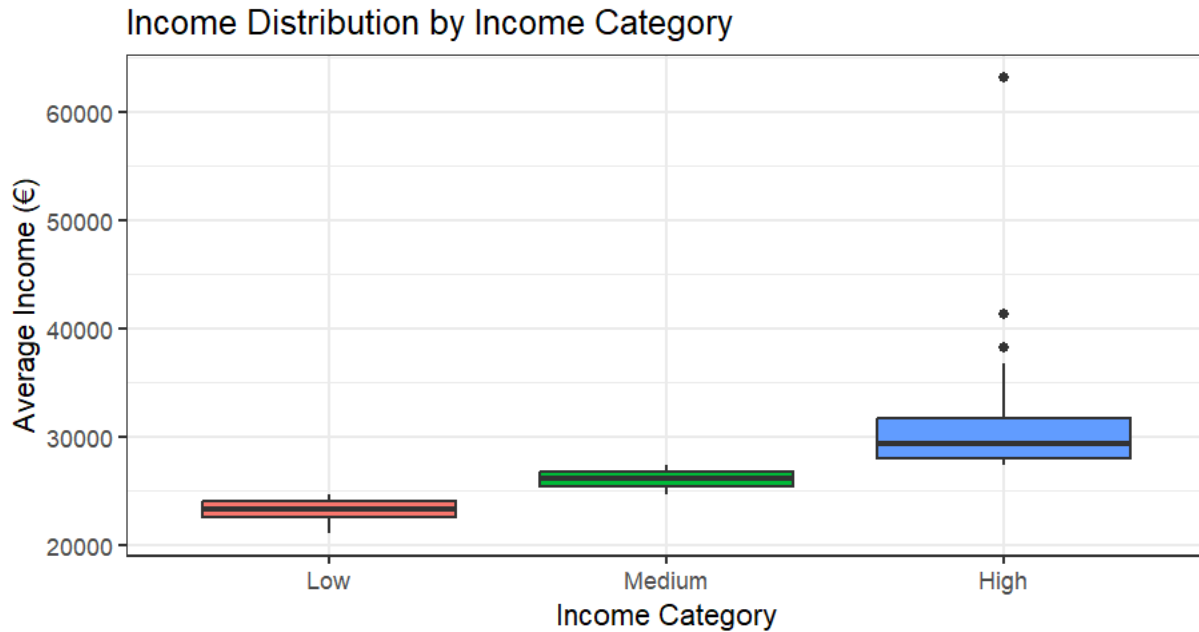
Figure 2

The boxplot of income by income category (Figure 2) confirms that the three categories—low, medium, and high—are well separated, though there are a few notable outliers. The municipality of Kauniainen, for instance, stands out dramatically with an average income of over €63,000, far exceeding even other high-income municipalities such as Espoo and Helsinki. Outliers like Kauniainen highlight the sharp economic disparities between municipalities in Finland, even though the majority cluster relatively closely around the median.
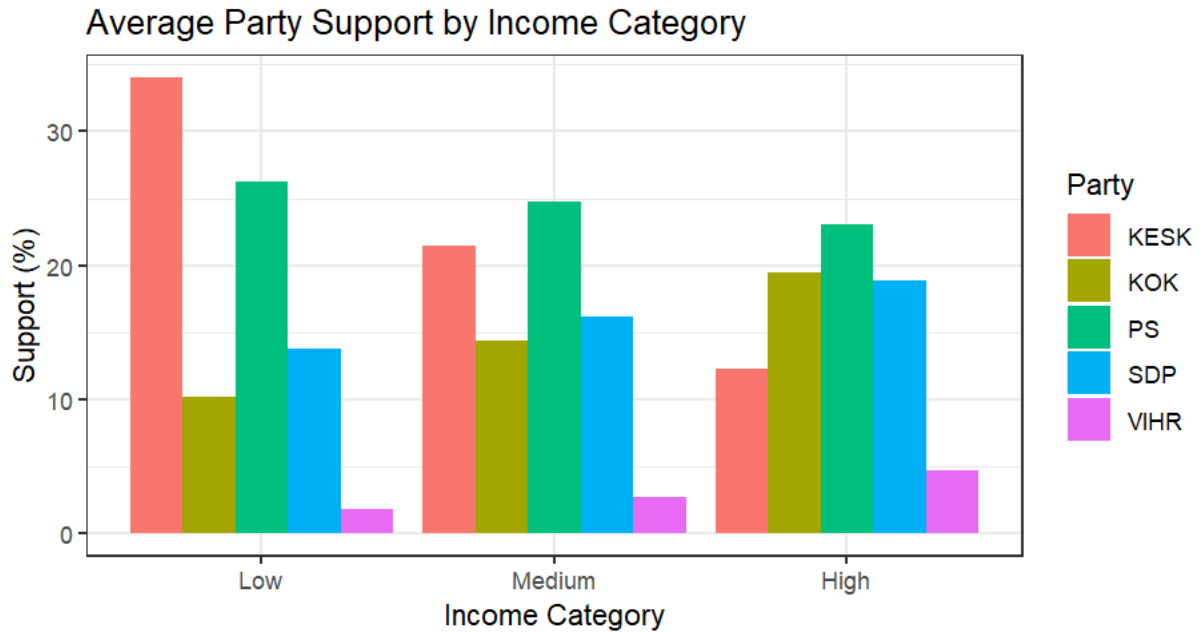
Figure 3

The barplot of mean party support by income category (Figure 3) provides additional insight into how income stratification relates to politics. Here, the National Coalition Party (KOK) emerges as the clear winner in high-income municipalities, while the Centre Party (KESK) dominates in low-income areas. The Finns Party (PS) has relatively even support across the low and medium categories but weakens sharply in high-income municipalities. Interestingly, the Social Democrats (SDP), often associated with working-class voters, do not show a strong concentration in any one income category but instead maintain a moderate presence across all levels. This suggests that SDP may draw support from a broad cross-section of the electorate, unlike KOK or KESK, which are more sharply aligned with particular income groups.

Together, these visualizations provide an important foundation: they indicate that income is not just a background variable but a significant factor shaping the political landscape of Finnish municipalities. Parties' core support bases are strongly linked to the economic prosperity of the regions in which they perform best.

4. Statistical Testing

To move beyond descriptive exploration, we applied a series of statistical tests to examine the strength and significance of the relationships between income and party support. These tests allow

us to quantify the patterns that were visible in the plots and determine whether they hold more generally.

We began by calculating Pearson correlations between average municipal income and support for each major party. The results revealed a clear polarization. Support for the National Coalition Party (KOK) was strongly and positively correlated with income ($r \approx 0.58$), meaning that municipalities with higher incomes were significantly more likely to support KOK. The Greens (VIHR) showed a similar positive association ($r \approx 0.56$), albeit slightly weaker. By contrast, the Centre Party (KESK) had a strong negative correlation with income ($r \approx -0.62$), while the Finns Party (PS) also leaned in this direction ($r \approx -0.26$). The Social Democrats (SDP) and the Swedish People's Party (RKP) displayed only weak positive correlations (around 0.19 each), suggesting that their support base is more broadly distributed across income levels. These results reinforce the socio-economic divide already suggested by the scatterplots: wealthier municipalities tend to favor right-liberal and urban parties, whereas less affluent areas lean towards agrarian or populist alternatives.

Next, we asked whether metropolitan municipalities differ significantly from non-metropolitan ones in terms of income. A Welch two-sample t-test initially suggested that the difference between metropolitan and non-metropolitan municipalities was not statistically significant ($p \approx 0.13$). However, given the small number of metropolitan cases (only three municipalities in our data: Helsinki, Espoo, and Vantaa), the t-test may not have been appropriate due to its reliance on normality assumptions. A non-parametric alternative, the Wilcoxon rank-sum test, provided a more robust result: here, the difference was significant ($p \approx 0.003$). This indicates that metropolitan municipalities do indeed have systematically higher income levels than the rest of the country, consistent with their roles as Finland's economic and administrative centers.

We also examined whether income varies systematically depending on which party is dominant in a municipality. An ANOVA test confirmed highly significant differences ($p < 0.001$). The follow-up Tukey post-hoc comparisons painted a detailed picture: municipalities dominated by KOK had average incomes about €7,600 higher than those dominated by KESK, and about €5,000 higher than those dominated by PS. Conversely, KESK-dominated municipalities were consistently at the lower end of the income spectrum, while RKP- and SDP-dominated areas occupied an intermediate position. These results provide strong evidence that the leading party in a municipality

reflects its economic profile: wealthier municipalities align with economically liberal parties, while poorer areas remain tied to agrarian or populist options.

Finally, we tested the relationship between income and party support using linear regression models, focusing on KOK as the most income-sensitive party. The first model, regressing KOK support on income alone, showed that for each additional €1,000 in average income, support for KOK increased by about 1.1 percentage points. The model explained about 34% of the variation in KOK support, which is quite substantial for a single predictor in social science data. In a second model, we added a dummy variable for metropolitan status to check whether the urban context had an independent effect. While the coefficient for metropolitan municipalities was positive, it was not statistically significant ($p \approx 0.30$). In other words, income is the key factor driving KOK's support, while metropolitan status does not add explanatory power once income is accounted for.

Taken together, the statistical testing confirms the patterns observed visually. Income is a central dividing line in Finnish politics, sharply differentiating the constituencies of parties like KOK and KESK. Moreover, the economic distinction between metropolitan and non-metropolitan municipalities is not just anecdotal but statistically robust. These findings suggest that income remains a powerful predictor of political alignment in Finland, shaping both urban-rural divides and broader electoral outcomes.

5. Diagnostics

Before drawing final conclusions from the regression analysis, it is essential to check whether the model meets the standard assumptions underlying linear regression. These include constant variance of residuals (homoskedasticity), approximate normality of residuals, and the absence of systematic patterns between fitted values and errors.

We began by applying the Breusch–Pagan test to detect heteroskedasticity. The result ($p \approx 0.25$) indicated no evidence of unequal error variance, suggesting that the spread of residuals is reasonably constant across municipalities regardless of income level. This strengthens confidence in the reliability of the standard errors and significance levels reported in the regression models.
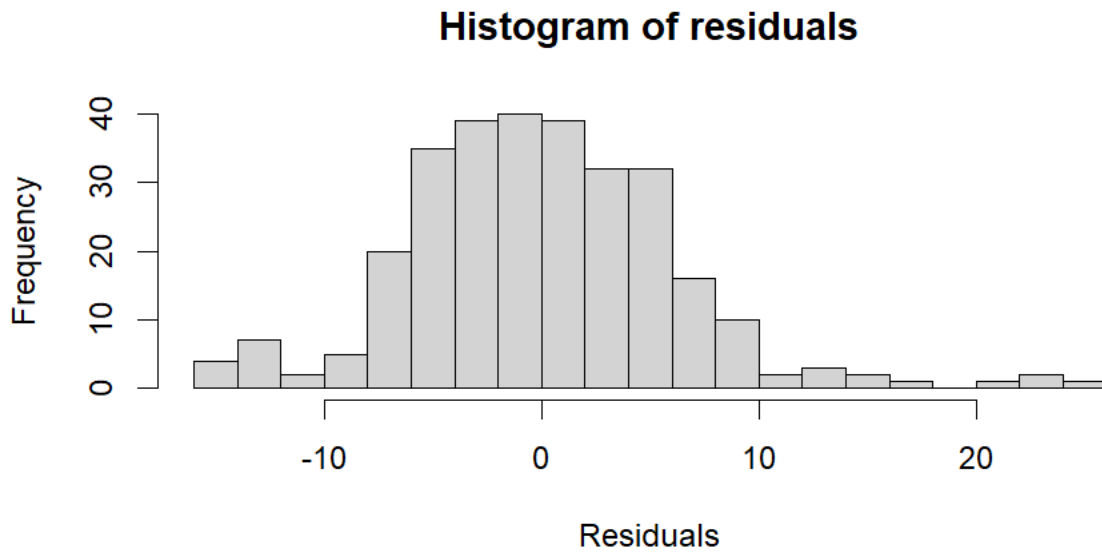
Histogram of residuals
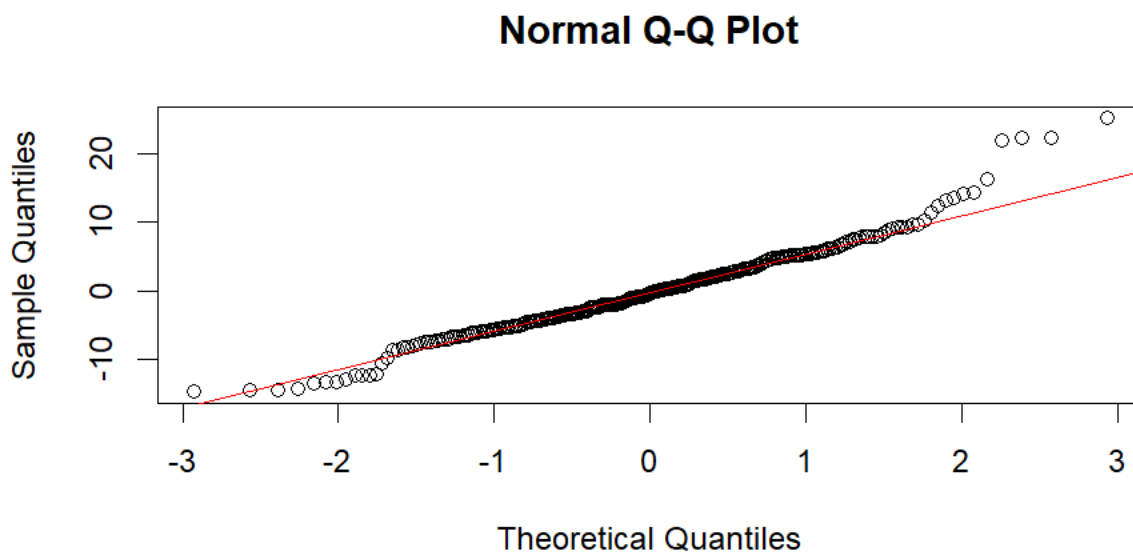

Figure 4

Normal Q-Q Plot

Figure 5

Next, we tested whether the residuals follow a normal distribution using the Shapiro–Wilk test. Here the results were less favorable: the test produced a p-value far below 0.01, formally rejecting the assumption of normality. This finding was also reflected in the histogram of residuals (Figure 4), which showed a distribution that is somewhat skewed, as well as the QQ plot (Figure 5), where

several points deviated from the straight reference line at the upper tail. These deviations were driven largely by a few very high-income municipalities such as Kauniainen, which act as outliers in the Finnish context.
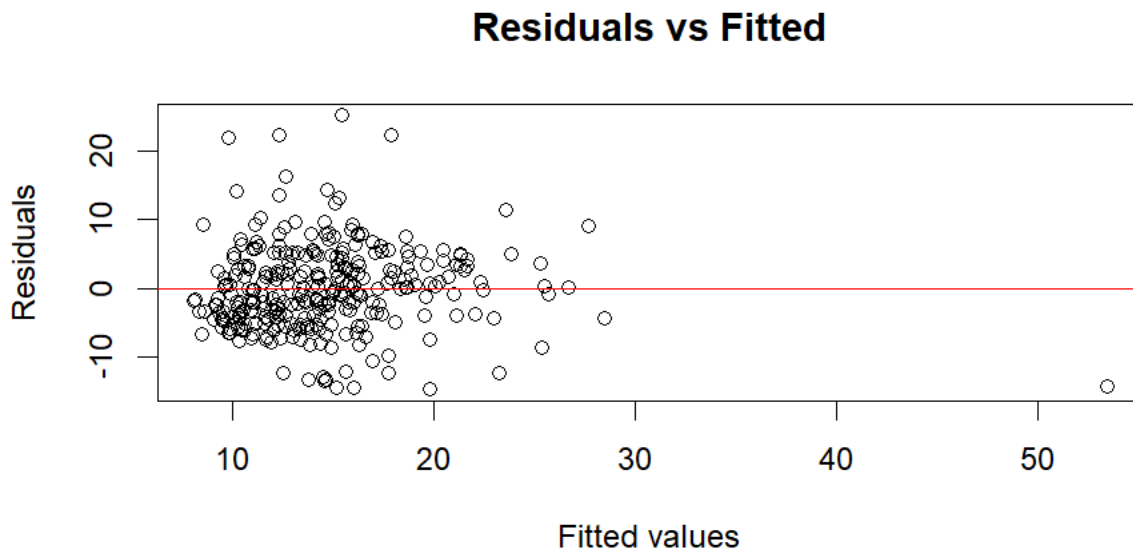
Residuals vs Fitted

Figure 6

After that, we examined the residuals vs. fitted values plot (Figure 6). The scatter of points was roughly centered around the horizontal zero line, but some curvature and clustering were noticeable. This suggests that while the linear specification is a reasonable approximation, it may not capture every nuance of the relationship between income and party support. In particular, the effect of income on KOK support may level off at the very highest income levels, a pattern that could be better modeled with non-linear terms or transformations in future work.

The diagnostic checks confirm that the regression results are broadly valid and not undermined by severe violations of assumptions. However, the evidence of non-normal residuals and the influence of outliers indicate that some caution is warranted. The general conclusion—that higher income strongly predicts higher support for the National Coalition Party—remains robust, but the precise effect sizes should not be interpreted as exact predictions, especially for extreme cases like very wealthy municipalities.

6. Conclusion

This analysis set out to explore the relationship between municipal income levels in Finland and patterns of political support in the 2023 parliamentary elections. By merging income statistics with detailed electoral results, we were able to examine both broad tendencies and specific party alignments across the country.

The descriptive statistics showed a clear picture of inequality across municipalities: while the national average income was around €26,600, places like Kauniainen reached incomes over €63,000, while others hovered closer to €21,000. These differences translated into visible contrasts in party dominance. The agrarian Centre Party (KESK) remained strongest in many lower-income rural municipalities, while the National Coalition Party (KOK) dominated in wealthier areas, particularly in and around the capital region.

Visual exploration reinforced these impressions. Scatterplots revealed a sharp positive association between income and support for KOK, as well as for the Greens (VIHR), while support for KESK and the Finns Party (PS) trended downward with higher incomes. Boxplots further confirmed the spread in incomes, with metropolitan municipalities like Helsinki and Espoo clustering at the higher end, while rural municipalities fell in the lower brackets. Outliers such as Kauniainen vividly illustrated the extremes of wealth in Finland.

The statistical tests provided formal confirmation. Pearson correlations were strong and consistent: higher income correlated positively with KOK and VIHR support, and negatively with KESK and PS. A Wilcoxon test showed that metropolitan municipalities had significantly higher incomes than the rest of the country, underscoring the socio-economic divide between the capital region and non-metropolitan Finland. The ANOVA test added further nuance: municipalities where KOK was dominant had, on average, significantly higher incomes than those dominated by KESK or PS, with differences often exceeding several thousand euros.

Regression analysis tied these findings together. A simple model revealed that income alone explained about one-third of the variation in KOK support—a strikingly strong effect in social science terms. Adding metropolitan status to the model did little to improve predictive power, suggesting that it is income itself, rather than simply living in a metropolitan area, that best explains

KOK's strength. Diagnostics indicated that the model assumptions were broadly acceptable, though some deviations from normality were caused by wealthy outliers.

Taken as a whole, the evidence paints a consistent story: income is a central dividing line in Finnish politics. Wealthier municipalities disproportionately support the market-liberal, pro-business National Coalition Party, while lower-income municipalities lean toward the Centre and the Finns Party, whose platforms emphasize rural interests and economic protectionism. The Greens also attract wealthier and urban voters, though not to the same extent as KOK.

This analysis, while constrained by municipal-level data and the presence of outliers, nonetheless provides a clear empirical basis for understanding the socio-economic foundations of party support in Finland. In a country often seen as egalitarian, income still plays a decisive role in shaping political preferences.