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National Data Infrastructure: The use of administrative data

January 2016 to December 2019

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BIRTH OF THE FIRST CHILD: WHAT CHANGES IN THE PATTERN OF FAMILY EXPENSES?

Using integrated administrative records on income tax and monthly household expenditures from electronic invoices, we estimate that, on average, the birth of the first child increases total household's expenditure by 20% in the six months that follow childbirth, as compared to the months before the beginning of the pregnancy. The change in total household expenditure can be attributed to an increase of 52% in expenditures in retail trade, 36% increase in health expenditures, 16% increase in electricity and gas and 9% in water. We also observe a significant increase in education expenditures, but contrary to the previous categories, education expenditures only increase sixth month after childbirth.

The birth of the first child has profound implications in multiple dimensions of family life. In this press release, we estimate the changes in monthly household expenditure associated with the birth of the first child based on monthly expenditure declared via electronic Invoices (*e-Fatura*) before and after the birth of the first child of the households that filled the Personal Income Tax. This work fall within the development of the [National Data Infrastructure](#) of Statistics Portugal.

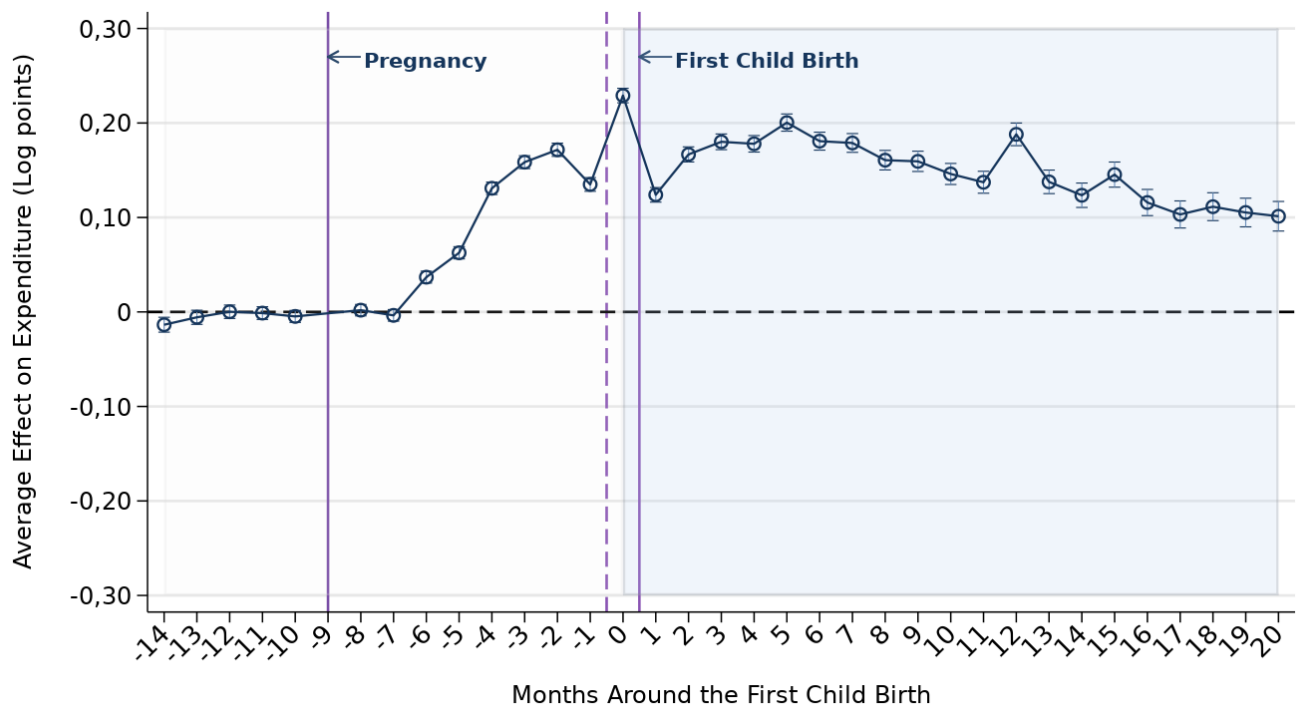
The birth of the first child results in an average increase in total household's expenditure by 20% in the first six months after birth, as compared with the time before the beginning of pregnancy, which is mainly due to the average increase of 52% in Retail, 36% in Health, 16% in Electricity and Gas and 9% in Water. We also observe a significant increase in education expenditures, but contrary to the previous categories, education expenditures only increase in the sixth month after childbirth.

The final effect on total expenditure due to the childbirth is mitigated by a reduction in Transportation and leisure-related expenses, which show a progressive decrease starting from the fourth month of pregnancy and reaching the minimum value in the month following the birth of the first child, gradually recovering thereafter. In the six months after the birth, Transport expenses decrease by 34% compared to the period before the



beginning of the pregnancy. Expenditure on accommodation and catering decreases by 31%, recovering only on the child's first birthday.

Figure 1. Effects on Household Monthly Expenditure: Total Expenditure

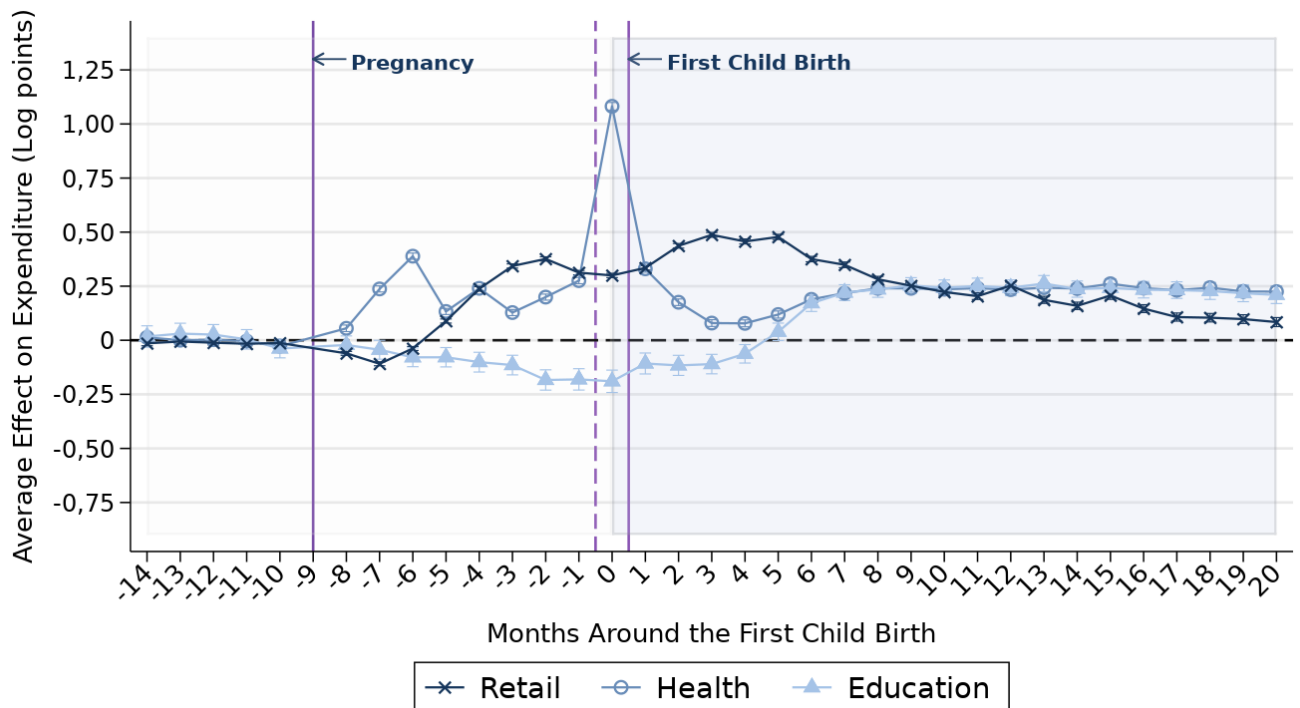


Source: Statistics Portugal, based on the information from Tax Authority.

In Figure 1 we can observe the average effect on the logarithm of monthly household expenditure resulting from the birth of the first child. The months are normalized around the month of birth, such that 'month 0' represents the month of birth of the first child, months -1, -2,..., -14 represent the months before the birth and months 1,2,..., 20 represent the months after the birth. An increase in household expenditure is observed from the fourth month of pregnancy, which is accentuated in the three months before the birth, in which expenditure is on average 16.8% (0.155 log points) higher than expenditure levels prior to pregnancy. In the month of birth, household expenditure peaks, being on average 19.7% (0.1797 log points) higher in the first six months after birth compared to the months before the beginning of pregnancy. In the following figures we present the expenditure categories that explain the observed evolution of total expenditure.



Figure 2. Effects on Household Monthly Expenditure: Retail trade, Health, and Education

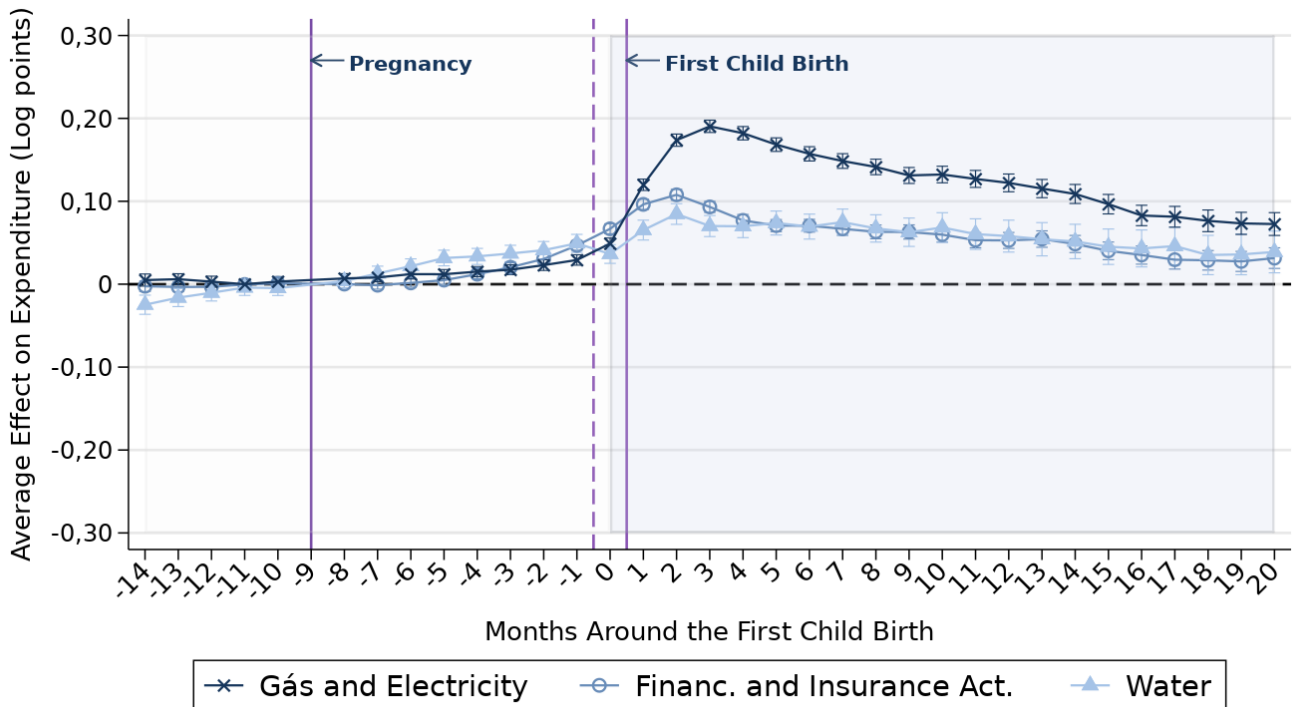


Source: Statistics Portugal, from the information of Tax Authority.

As shown in Figure 2, during the pre-pregnancy period, there is a significant increase in Health expenses, especially between the third and fourth months of pregnancy. From the fourth month onwards, there is a noticeable increase in Retail Trade expenses. In the month of birth, there is a peak in household Health expenses, which are approximately twice as high as those observed in the period before the start of pregnancy. The magnitude of the effect on healthcare expenses decreases in the six months following birth, while there is a corresponding increase of 51.5% (0.4156 log points) in expenses at Retail establishments. From the first year of life onwards, Health and Retail expenses stabilize at a permanent increase of 26.9% (0.2383 log points) and 16.1% (0.1496 log points), respectively.



Figura 3. Effects on Household Monthly Expenditure: Gas and Electricity, Water, and Finance and Insurance

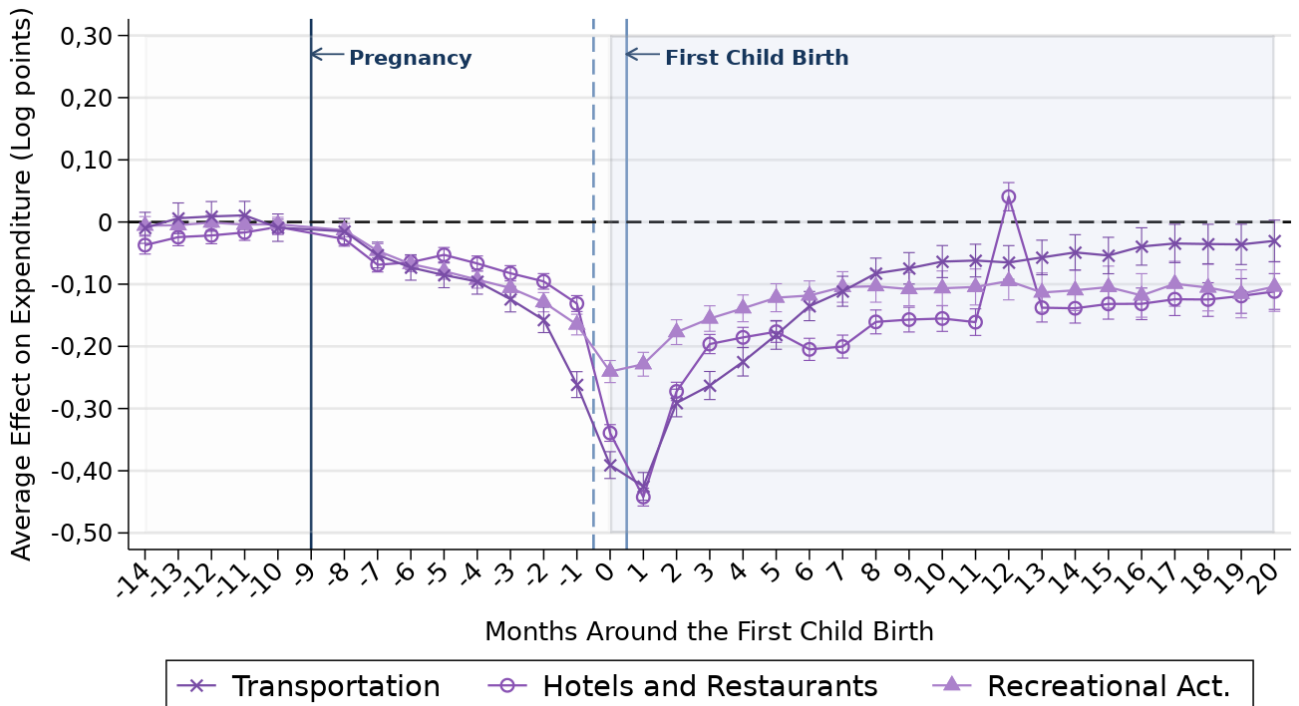


Source: Statistics Portugal, from the information of tax Authority.

In the months preceding the birth of the first child, there is a tendency for an increase in expenses related to Electricity and Gas, Water, and Financial and Insurance activities, and this increase becomes noticeable in the months following the birth. In the six months following birth, expenses on Electricity and Gas increase on average by 15.9% (0.1472 log points) compared to the period before the start of pregnancy, stabilizing at an increase of around 9.6% (0.0922 log points) from the first year of life onwards (Figure 3).

Expenses on Education exhibit a distinct pattern as they decrease between the pregnancy period and the sixth month of life, but increase thereafter, stabilizing at a permanent increase of 26.3% (0.2338 log points) from the ninth month of life onwards (Figure 2).

Figura 4. Effects on Household Monthly Expenditure: Transportation, Hotels and Restaurants, and Recreation



Source: Statistics Portugal, from the information of Tax Authority.

Despite of the increases observed in important household expense categories due to the birth of the first child, the overall effect on total household expenditure is attenuated by a decrease in expenses on Transportation, Hotels and Restaurants, and Recreation activities (Figure 4). Expenses on Transportation, Hotels and Restaurants gradually start to decrease from the third month of pregnancy, decreasing significantly in the month of birth and the following month. In the month that follows childbirth, there is a reduction of 52.9% (0.4251 log points) in Transportation expenses and a reduction of 55.6% (0.4423 log points) in Hotels and Restaurant expenses when compared to pre-pregnancy amounts.

From the second month of the child's life onwards, expenses on Transportation, Recreation activities, and Hotels and Restaurants gradually start to increase, but they never reach the levels observed in the months before the start of pregnancy. The only exception is Hotels and Restaurant expenses in the twelve months following birth, which temporarily increase by 4.2% (0.0407 log points) compared to the period before the start of pregnancy, likely due to expenses related to celebrating the child's first year of life.



METHODOLOGICAL NOTE

The study presented in this Press Release was developed based on information from electronic invoices (*e-Fatura*, that can be defined as a mandatory reporting invoices system implemented by the Tax Administration as part of the administrative simplification and anti-fraud measures. Electronic transmission of the invoices issued by individuals or legal entities that have their head office or permanent establishment in Portuguese territory to the Tax and Customs Authority is mandatory. This administrative register includes all the invoicing recorded electronically by the issuer, whether the acquirer / buyer has requested an invoice from. However, consumers who request a receipt with their taxpayer number can benefit, until a certain amount, through the respective deductions on payable personal tax, and weekly lotteries of public debt) and the Personal Income Tax (*IRS*), transmitted by the Tax Authority to Statistics Portugal, as the national statistical authority and central body for the production and dissemination of official statistics, under a written agreement signed between the two entities. It is a part of the [StatsLab](#) portal, intended to present statistics in development and taking advantage of the potential of the information associated with Statistics Portugal's National Data Infrastructure. The estimation was based on the total of households declared in the Personal Income Tax of 2019, whose first child was born between January 2016 and December 2018, and with tax residence in the national territory. The monthly expenses recorded in the e-Invoice system between 2016 and 2019 were integrated into this reference universe, and the monthly expenditure value was obtained per household and per primary economic activity code of the issuing entity. From this process, a panel of 149,136 households was obtained, of which 86% are present in the set of 48 months of the sample, resulting in an estimation sample of 6,902,170 observations. The average effects on household expenditure due to the birth of the first child were obtained from the least squares estimation of a linear regression of the logarithm of expenditure on a set of binary variables indicating the months before and after the birth of the first child, with the ninth month before birth as the reference, and including fixed effects for time and individuals. (Method TWFE – Two-Way Fixed Effects).¹ 95% confidence intervals were calculated and are represented in the graphs by two horizontal bars that delimit the estimated coefficients.

¹ Wooldridge, Jeffrey M., Two-Way Fixed Effects, the Two-Way Mundlak Regression, and Difference-in-Differences Estimators (August 17, 2021). Available at SSRN: <https://ssrn.com/abstract=3906345> or <http://dx.doi.org/10.2139/ssrn.3906345>



ACRONYMS AND DESIGNATIONS

IRS – Personal Income Tax

AT – Tax Authority

CAE – Classification of Economic Activities

For simplification purposes, the designation of the main economic activity of the establishments where the expenses were made was abbreviated. The used designation corresponds to the following section of the CAE: "Gas and Electricity" – Section D: Electricity, gas, steam, cold and hot water and cold air; "Water" – Section E: Water collection, treatment and distribution; "Retail trade" – Section G: Wholesale and retail trade; repair of motor vehicles and motorcycles; "Transportation" – Section H: Transportation and storage; "Hotels and restaurants" – Section I: Accommodation and food services activities; "Finance and Insurance" – Section K: Financial and Insurance activities; "Education" – Section P: Education; "Health" – Section Q: Human health and social work activities; "Recreation" – Section R: Arts, entertainment, sports and recreation activities.