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The Portuguese Household Budget Survey: A Review and Recommendations for Data Collection

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Dissertation

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Biographical note

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Abstract

This work aims to provide an insight into the Household Budget Survey in Portugal, and within the European Statistical System, and in other countries, and provide actionable recommendations for the upcoming methodological revision of the Household Budget Survey in Portugal. The HBS is revised at 5 year intervals, and is currently done in the form of a traditional proxy survey with an SRS reflecting Portuguese households.

A systematic literature review exploring the current state of the HBS and challenges and trends in this space is used to this end, looking at trends such as the increasing use of administrative and non-traditional data sources in surveying. This is then followed by a broader benchmarking review of the Portuguese HBS that is interdisciplinary in scope, in which topics such as data linkage and the transition to administrative data sources are covered, and recommendations for a gradual transition to the increased usage of administrative data sources such as tax data and social payments data is proposed.

Keywords: Household Budget Survey, Official Statistics

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Glossary

Abbreviations

BDP - Bank of Portugal
BLS - Bureau of Labour Statistics (U.S.)
CE - Consumer Expenditure Survey (U.S.)
CPI - Consumer Price Index
CPLP - Comunidade dos Países de Língua Portuguesa (Organisation of Lusophone Countries)
CoP - Code of Practice (European Statistical)
EC - European Commission
ECB - European Central Bank
ECSC - European Coal and Steel Community
E-Fatura - Electronic receipts linked to individual fiscal numbers (Portugal)
EFTA - European Free Trade Area
ESCP - European Statistics Code of Practice
ESS - European Social Survey
ESS - European Statistical System
EU - European Union
EU-SILC - EU Statistics on Income and living conditions
FEP - Faculty of Economics (University of Porto)
GDPR - General Data Protection Regulation
GSBPM - General Statistical Business Process Model
HBS - Household Budget Survey
IECOM - Survey of Trading Enterprises and Companies (Portugal)
IEFP - Instituto do Emprego e Formação Profissional (Provides training and education, particularly with regards to the unemployed)
IMF - International Monetary Fund
INE - Statistics Portugal
IRS - Imposto sobre o Rendimento das Pessoas Singulares (Income tax in Portugal)
IRS - Internal Revenue Agency (U.S.)
MOTUS - Modular Online Time Use Survey
NEET - Not in Education, Employment, or Training
NBER - National Bureau of Economic Research (U.S.)
NIFF - Tax/Fiscal Number (Portugal)
NISS - Social Security Number (Portugal)
NSI - National Statistical Institute
NUTS - Nomenclature of Territorial Units for Statistics (primarily EU and ESS)
OCR - Optical Character Recognition

OECD - Organisation for Economic Cooperation and Development

ONA - Other National Authority

QAF - Quality Assurance Framework

RER - Electronic Rent Receipts (Portugal)

SS - Segurança Social(Portugal)

UN - United Nations

UP - University of Porto

Methods

Capture Recapture - Survey method often used in animal studies

DS - Diary Survey

SRS - Stratified Random Sample

TPoPs - Telephone Point of Purchase Survey

Web scraping - Use of automated means to collect online data (primarily related to prices)

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Chapter 1

Introduction

The Household Budget Survey, or HBS, sometimes known as the Consumer Expenditure Survey or CE, is a staple of statistical institutes worldwide. It collects information on household income and expenditures, and can form the basis for the basket of goods used to calculate CPI, the Consumer Price Index, and governmental policy decisions in areas such as social services and poverty reduction, (Greg & Stockburger, 2022), (Serafino & Tonkin, 2017). It is often conducted in the form of a sample survey, but may also take the form of synthetic one (using a sample generated from administrative records as opposed to one collected in a survey) using administrative data. This work seeks to look at the differing practices in other countries, the current state of affairs in Portugal, and suggest potential improvements in the way that the HBS is conducted in general, and more specifically in the Portuguese context. In this sense, the work seeks to achieve the following objectives:

- 1) Determine the current state of the HBS in Portugal and in other Jurisdictions.
- 2) Provide recommendations for improvements to the HBS methodology in general, focusing on data collection aspects, and in a more targeted manner for Portugal.

The first objective has been met by briefly analysing the current framework for the collection, processing, creation and dissemination of official statistics in Portugal and in the broader European context, followed by a systematic literature review of HBSs and related topics, to get a better understanding of the current situation. The research questions for the literature review are:

- 1) What is the current state of HBS's and official surveying in general?
- 2) Are there any trends or relevant innovations with regards to improvements in data collection methods?

In this way, the literature review covered the first objective, and the second is covered by the benchmarking review. There was some overlap in terms of the concepts covered by both literature reviews given the rather focused scope of the work, however.

Subsequently, a benchmarking review, that is conducted in a broader fashion then seeks to look at practices and innovations in other jurisdictions, that may be applied to the upcoming iteration of the HBS in Portugal. The research questions for the benchmarking review are as follows:

- 1) What are the best practices in other countries?
- 2) What are potential improvements to the HBS?
- 3) What are potential sources of error in the HBS?

The findings of the benchmarking review, and part of the literature review, are the basis for the recommendations laid out in the recommendations section (5). These are presented in terms of general recommendations for conducting an HBS, and then again as country specific ones for Portugal. Following the recommendations section, is the conclusion, which briefly summarises the work and the findings of the two reviews.

The thesis is divided into chapters; the introduction (this chapter), a business understanding section (2), the methodology (3), a benchmarking section (4), the recommendations (6) and the conclusion (6). The business understanding covers general concepts in Official Statistics and the producers of these in the EU and in Portugal. Following this, the Methodology section documents the Systematic literature review, how it was conducted, and its findings. Subsequently, the Portuguese HBS is benchmarked against comparable surveys as seen in the Benchmarking Review Section, and subsequently recommendations based on the benchmarking in the Recommendations section. The findings are then revisited and summarised in the Conclusion section.

Chapter 2

Business Understanding

In the European context, Official Statistics are produced by National Statistical Institutes (NSIs) and Other National Authorities (ONAs), (European Commission, 2010). This may however, differ for countries outside of the European Statistical System (ESS). Some of the key responsibilities of the NSI's are the census, compilation of price indices, conducting the household budget surveys, and other household and business surveys, as well as, collecting, processing, treating and disseminating data and statistics at a national, regional and in some cases, local level.

2.1 European Union

The European Union (EU) is a driving force in continued European integration, including in the area of Official Statistics, through the directives of the European Commission (EC) and under the guidance of Eurostat. In going from the European Coal and Steel Community (ECSC) to the European Union, and the accompanying integration between countries whether economic, social or political required the harmonization of statistics between member states to determine accurate financial commitments, grants or political representation for each state and region, (De Michelis, 1993). It is in this sense that the EU is relevant to Official Statistics (apart from its oversight role through Eurostat).

2.1.1 European Commission

Similar to the EU, the commission is relevant to the field of Official Statistics, whether it be through its oversight of Eurostat and the ESS in general, or through the various directives relating to statistical reporting passed by the EC. Oversight of the statistics produced by NSIs and ONAs however is generally left to the institutions themselves, or to Eurostat (2014).

2.1.2 European Statistical System

The European Statistical System (ESS) has its basis in the 1988 decision of the European Commission to establish a statistical information policy. Eurostat itself is a directorate-general of the European Commission and can be considered to head the ESS. The NSIs and ONAs from EU member states, European Free Trade Area (EFTA) member states, and EU candidate nations, along with Eurostat and the European Central Bank (ECB) are the constituent members of the ESS. Coordination and standardisation among these constituents is a primary

aim of the ESS, (De Michelis, 1993). It should be noted that the ESS also coordinates work with EU candidate states and international organisations such as the Organisation for Economic Cooperation and Development (OECD), International Monetary Fund (IMF), United Nations (UN) and the World Bank in the interest of statistical comparability.

2.1.3 Eurostat

Eurostat is a directorate general of the European Commission, but is in essence, the statistical agency of the EU, and is responsible for both collection but primarily the aggregation of data to create statistics from member states. It provides guidance to the NSI's, ensures adherence to regulations, and ensure the harmonisation of data collected and disseminated by member states. A primary reason for this work is the ongoing drive towards administrative data sources which is being coordinated at the European level, (Eurostat, 2014).

2.1.4 European Statistics Code of Practice

The European Statistics Code of Practice serves as a code of conduct for those working in the field of official statistics. It was first developed in 2005, inspired by the UN Fundamental Principles of Official Statistics, and is relevant to any production of official statistics within the ESS. Along with the Quality Assurance Framework (QAF), it provides general guidelines for the various processes related to the creation of official statistics, (Eurostat, 2017).

The code of practice is in essence self regulatory, with adherence controlled by organisations within the ESS itself, except for those principles which constitute legal obligations. This not imply however that the guidelines laid out in the code are to be taken lightly, given the risk of possible academic censure in the case of collaborative research with institutions of higher education, among other possible penalties depending on the nature of the infraction, (Eurostat, 2017).

The European Statistics Code of Practice (CoP) is not the only standard which countries may adhere to. The UN and the US each have their own Statistical principles, though there is significant overlap between the three. The UN and the US versions have 10 and 4 principles each as opposed to the 16 principles in the European version, with the European version being generally more detailed in almost all areas. Given that the US version claims conformity with the spirit of the EU version, and is acknowledged to have been influenced by it, it is implied these codes of practice have a degree of equivalence, (Pierson, 2015). The UN version (Fundamental Principles of Official Statistics), (UN Statistical Commission et al., 1994), precedes both the EU and American versions, having first been published in 1994, and refers to the necessity of reliable statistics as a prerequisite for democratic society. This version also explicitly acknowledges the right of statistical agencies to 'comment on erroneous interpretation and misuse of statistics', (UN Statistical Commission et al., 1994).

2.1.5 Quality Assurance Framework

The Quality Assurance Framework (QAF), is a guideline to ensure the quality and robustness of official statistics produced in the ESS and those NSI's working in coordination with the ESS (namely those of EU candidate states),(Eurostat, 2019). Part of these measures include peer reviews, and conferences and training (Eurostat, 2019).

The peer reviews are external, independent evaluations of NSIs and Eurostat conducted every five years. They assess compliance with the CoP, identify best practices, and make recommendations for improvements. The first round of ESS peer reviews took place from 2006-2008, and the second round from 2014-2015. The third cycle started in 2021 and focused on coordination roles in the system. Additionally, conferences provide a platform for dialogue and collaboration among ESS members and stakeholders, while training programs aim to develop skills and share knowledge among ESS staff. These programs support the implementation of the CoP principles.

2.1.6 GSBPM

The Generic Statistical Business Process Model (GSBPM) is a framework developed by the United Nations Statistical Commission to guide the production of official statistics, (United Nations Economic Commission for Europe et al., 2018). It provides a structured and systematic approach to organizing and managing statistical activities, ensuring the quality and comparability of data across different statistical organizations. The GSBPM consists of several interrelated elements, each playing a crucial role in the statistical production process.

The GSBPM is relevant both at the European and international levels due to its standardized and harmonized approach to statistical production. It provides a common framework that enables statistical organizations across different countries and regions to collaborate, share methodologies, and ensure comparability of statistical outputs. In the European context, the GSBPM serves as a guideline for statistical production within the European Statistical System (ESS), ensuring consistency and coherence among member states .

At the international level, the GSBPM promotes the comparability of official statistics across countries, enabling data users to analyze and interpret information in a global context. It supports international cooperation in statistical activities, facilitates data exchange between countries, and contributes to the development of international statistical standards. The GSBPM's relevance lies in its ability to enhance the credibility, reliability, and usefulness of official statistics, thereby strengthening evidence-based decision-making and policy formulation at both regional and global levels

2.2 NSI

NSI's or National Statistical Institutes are the primary source of official statistics in the member states of the ESS. They work in coordination with the ONA's (primarily central banks) to produce official statistics at a national level according to the standards mandated by both national regulations and Eurostat (EU level legislation is generally transcribed to national law, but there are sometimes national level differences in terms of practices in cases

where these do not conflict with those at the European level). The role of NSIs within the ESS and Eurostat is multi-faceted. Firstly, they play a crucial role in the implementation of European Union legislation concerning statistics, which includes harmonizing methodologies, concepts, and definitions across member states. This harmonization effort is aimed at enabling accurate and meaningful comparisons of statistical information between countries, thereby facilitating cross-national research and policy analysis, (Eurostat, 2021), (De Michelis, 1993).

Secondly, NSIs collaborate closely with Eurostat, the statistical office of the European Union, to ensure the smooth functioning of the ESS. Eurostat acts as the central hub for coordinating statistical activities at the EU level and provides technical support and guidance to NSIs. This collaboration encompasses the exchange of data, methodologies, and best practices, as well as the coordination of major statistical initiatives and surveys conducted at the European level. NSIs also actively contribute to the European Social Survey (ESS), which is a flagship social research project conducted across Europe. The ESS aims to provide reliable and comparable social data for academic research, policy formulation, and public awareness. NSIs participate in the design and implementation of the ESS surveys, ensuring that the data collected aligns with national statistical priorities while also adhering to the ESS standards for comparability and reliability.

Additionally, NSIs are responsible for disseminating statistical information to various user groups, including policymakers, researchers, businesses, and the general public. They employ a range of channels, such as publications, databases, and interactive tools, to make statistical data accessible and user-friendly. NSIs also engage in data validation, quality assurance, and metadata documentation to enhance the transparency and credibility of the statistics they produce. In conclusion, as academic observers, we recognize NSIs as vital institutions within the wider ESS and Eurostat. They are at the forefront of producing official statistics in their respective countries, ensuring adherence to harmonized methodologies, collaborating with Eurostat, and contributing to important initiatives like the European Social Survey. Their efforts contribute to evidence-based research, informed policy-making, and public understanding of social and economic phenomena within the European context, (Eurostat, 2019).

2.2.1 The Portuguese Statistical System

The Portuguese Statistical system, as established by law *Lei n° 22/2008, de 14 de Maio da Assembleia da República* (2008), consists of INE, the Bank of Portugal (BDP), the regional statistical bodies of the Açores and Madeira, and other entities producing official statistics, (INE, 2019). These entities produce official statistics for Portugal, including the Census, and the HBS for example, which are within INE's remit.

2.2.2 INE

INE is the NSI for Portugal, and is, along with the Bank of Portugal, one of the primary producers of Official Statistics for Portugal. Apart from the basis in the Portuguese Statistical System law (*Lei n° 22/2008, de 14 de Maio da Assembleia da República*, 2008), it is also governed by (*Lei n° 136/2012, de 2 de Julho do Presidência do Conselho de Ministros*, 2012). It is, along with the other NSI's and ONA's of the European Statistical System or ESS, under the remit of

Eurostat. Practically, this entails the harmonization of data production and adherence to the standards set by Eurostat, (INE, 2019). Similar to other NSIs INE is bound by both GDPR, (European Parliament & Council of the European Union, 2016), and by national privacy law (*Lei n.º 58/2019, de 8 de agosto da Assembleia da República*, 2019) in its handling and treatment of personal information. This has been taken into consideration for the purposes of this work. Like other NSIs, INE creates official statistics for consumption by the public, as well as for use by government bodies at the local, national, and European level, (INE, 2019).

2.3 ONA

In the context of this work, the Other National Authorities are Portuguese unless otherwise specified. Primarily this would refer to the Banco de Portugal, but may in some limited contexts, also refer to other producers of official statistics such as the regional statistical bodies in the Açores and Madeira, Finanças, IEFP, or Segurança social, of which the latter three are the Tax/Financial Authority, the unemployment and training agency and the social security program respectively in the Portuguese context, (INE, 2019), (*Lei n.º 22/2008, de 14 de Maio da Assembleia da República*, 2008).

2.4 Household Budget Survey

The Household Budget Survey refers to the survey of the income and expenses of Portuguese households (or others where mentioned). It is generally conducted as a sample survey of households, and may be conducted using administrative sources such as in the Nordic Countries Tongur (2019). This work is being conducted in the context of an upcoming revision to the Household Budget Survey in Portugal, with an eye to incorporate best practices from other countries and contexts while keeping in mind existing ones INE (2022). Consumer Expenditure Surveys or CESs are the American term for an equivalent to the Household Budget Survey, and may be used to refer to the HBS when looking at the American context Crossley and Winter (2014), Brummet et al. (2018), Serafino and Tonkin (2017).

2.5 Administrative Data

Administrative Data refers to those collected through administrative means, i.e. not originally for statistical purposes. Traditionally, these have not been utilized to their full potential, and NSIs have often relied on Census and other survey data. Given the improvements in administrative data coverage (birth and death registrations for example are close to complete in ESS countries, but are much lower in many developing nations), using these data sources is a valid alternative to collecting data for statistical purposes only, and in the process, duplicating both efforts and datasets. Of note however, is the need to combine data sources in order to produce population statistics. Given increases in computational power, doing so is no longer outside the realm of possibility, and is increasingly, the reality for many NSIs, (United Nations Economic Commission for Europe et al., 2018), (Brummet et al., 2018), (Lohmann, 2011).

Chapter 3

Methodology

This project contains a systematic literature review, and an additional benchmarking review of a variety of related topics which have both been combined to create this work, and to provide recommendations. This section seeks to discuss the systematic literature review, and, is followed by a brief explanation of the benchmarking review also included in the work.

3.1 Systematic Literature Review

The project consists of a systematic literature review of a number of topics related to the state of HBSs, related topics, and, surveys in general. In conducting such a broad review, a number of tools were used to cast a wide net, which was then limited through the course of the systematic review. The review itself can be divided into the initial phase of searching for papers, after which the abstracts of the screened papers were reviewed, and from among those, a sample of relevant papers was analysed in further detail. Since the first literature review is primarily focused on the HBS, the research questions to be answered by the first phase are as follows:

- 1) What is the current state of HBS's and official surveying in general
- 2) Are there any trends or relevant innovations in this area?

In starting the literature review, *SCOPUS* (2024), was seen to have the most relevant content when simply searching for the key term 'Household Budget Survey', as compared to the results found using PubMed (2024) and IEEE (2023), which are also popular indexed scientific databases, and were believed to be possibly of interest prior to the test search. Thus, SCOPUS was selected as the search platform for the Systematic Literature review. Using a rather limited search in SCOPUS using the primary keyword 'Official Statistics', and the secondary keywords 'Household Budget Survey', 'Consumer Expenditure Survey', 'Household Expenditure Survey', 'Administrative data', and 'Scanner Data', as seen in table 3.1, a total of 218 papers were found, which was then limited to 190 papers when the scope was limited to 2005-2024. The choice of the year 2005 for the delineation has to do with the previously conducted literature review, from which the oldest papers were from 2005. IEEE was also searched with the same search parameters, however, the 18 results found were found to be out of scope and not included. Though Pubmed was also used as a resource for the broader

Primary Keywords	Secondary Keywords	Papers Found
Administrative Data Household Budget Survey Consumer Expenditure Survey Household Expenditure Survey Scanner Data	Official Statistics	218 (All Time) 190 (2005-2024)

Table 3.1: Keywords

literature review, it was not included in the systematic literature review to prevent scope creep (and excessive results).

Once the 190 papers were selected from SCOPUS, the exclusion criteria seen in table 3.2 were used to narrow them down to those selected for abstract analysis, and then those selected for detailed analysis/review. The selection/sorting of the papers was done using Rayyan (2024), which helped provide a framework for the screening of the papers. The papers were loaded to Rayyan, and then the exclusion criteria were used to winnow the papers to the final selection for detailed analysis.

Step	Criteria	Papers Excluded
1.	The paper is a duplicate	1
2.	The paper is not in English, French, or Portuguese	4
3.	The Paper is not available due to a paywall (and UPorto does not have access)	28
4.	The paper is from the wrong area of study	76
5.	The paper was not seen as relevant to the study	66

Table 3.2: Exclusion Criteria

The first exclusion criterion led to the exclusion of one paper (since only a single source and search was used, this is to be expected). The second criterion led to the removal of a further 4 papers. Following this, the papers' availability was confirmed using criteria 3., considering that papers with open access, as well as those available using a university login from UPorto could be considered as available. Though the distinction is minute, many papers included after this screen in fact do have paywalls, however as UPorto has institutional access to them, it was considered that these works were 'open-access' in that they did not require additional access or subscriptions. This led to the removal of a further 28 papers.

Exclusion criterion 4. led to the removal of a further 76 papers found to be from the wrong area of study based on the keywords in the paper (those not included in the search criterion). The remaining 81 papers were then screened for the abstract analysis, of which 66 were removed using exclusion criteria 5., after an analysis of the abstracts. The details of this process are discussed further in the following section.

3.2 Systematic Literature Review Results

The results of the systemic literature review have been included in this section, whereas the results of the other, broader benchmarking review, specifically for identifying recommendations and best practices, have been included in the section for the benchmarking review 4. The process can be seen in a decision tree representing the process, as seen in Fig. 3.1. The following sections detail the process, the results, and also include some analysis of the papers themselves.

3.2.1 General Analysis

In the general analysis stage, the papers were analysed, and a further two exclusion criteria were applied to winnow the number of papers included in subsequent stages of the review.

As seen in Fig. 3.2, one can see a general increase in the number of papers published as captured by the search terms in table 3.1 over time, with a significant increase after the year 2014. The number of papers then appears to peak in 2021 at 22 published papers, with a decline seen in 2022, 2023, and observed for the first part of 2024. Though there appears to be a pattern with regards to the published papers, the very limited nature of the search, along with the limited number of papers in the area means that there is a much larger variation between years when compared to better studied areas. This also indicates however, that the number of papers published, and more specifically, their trends, are not necessarily of interest on their own, and require further data for meaningful analysis.

Additionally of interest is the origin of the papers, which have been organised by region as seen in Fig. 3.3. The European region has been split into EU and non-EU countries, and the Americas (North and South) have also been amalgamated for the purposes of this analysis. Though the other region does not make sense geographically (Antarctica is not known to be a font of official statistics literature), it has been included, and indicates papers where the country of origin has not been added, or is not known. As might be inferred from looking at the figure, the total number of papers appears to exceed the number of papers included in this literature review, as many papers have multiple countries of origin.

The selected papers are also diverse in terms of their area of study, as seen in Fig. 3.4. As with the classification by region, a paper can be classified as belonging to more than one area of study (in the case of interdisciplinary works). Given the restricted nature of the search terms, it is assumed that the works all have a linkage to either official statistics or household surveys. Unsurprisingly, the most common areas of study include medicine, economics, and social sciences, followed by the 'other', which includes those that were not classified in the top 10 categories. Though the results of the general analysis seem to not necessarily be aligned with official statistics, looking at the results of the detailed analysis provides for a more focused collection of papers.

3.2.2 Review of Abstracts

The papers which were not screened out were used in the abstract analysis, at which point 81 papers remained. Of these papers however, the majority (66 papers), were removed for meeting exclusion criteria 5, that is, they were not seen as being relevant to the work at hand. In reviewing the abstracts, one can only glean so much about each work, yet for the purposes of brevity, abstracts were evaluated based on their perceived relevance to this literature review.

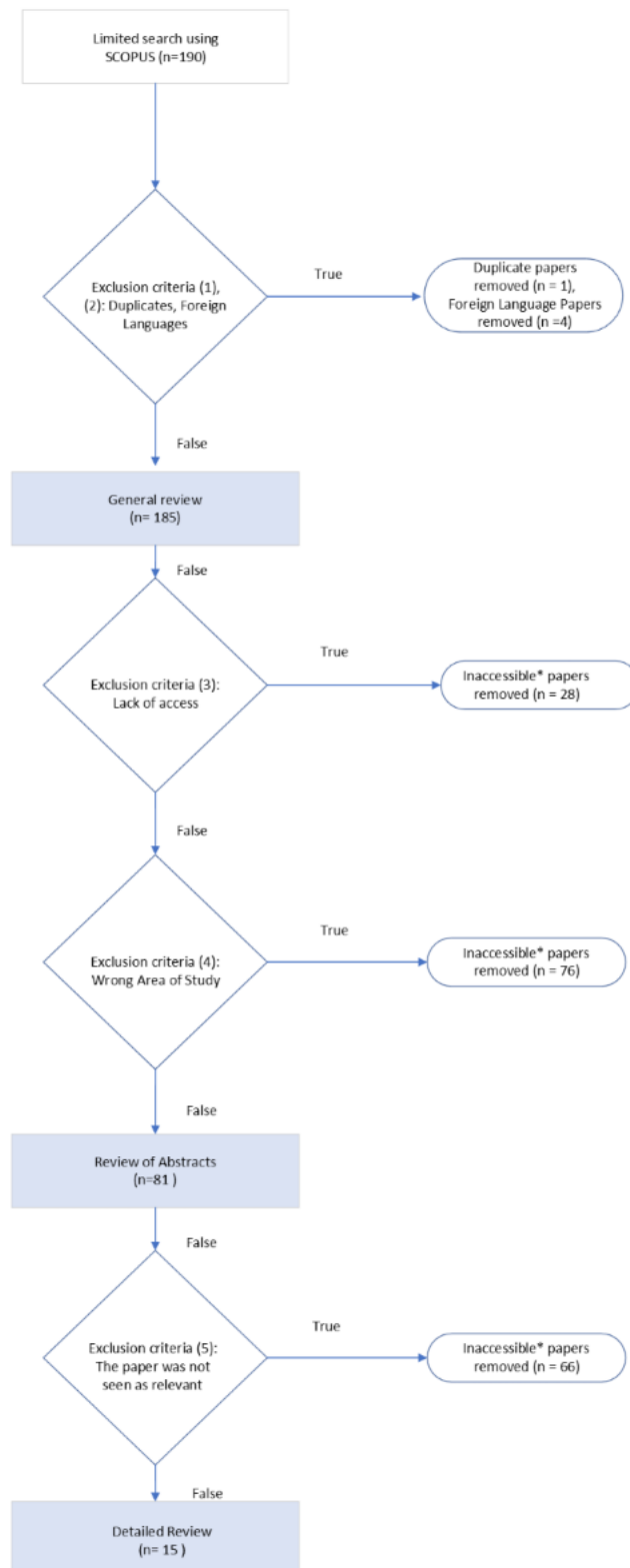


Figure 3.1: Literature Review Methodology

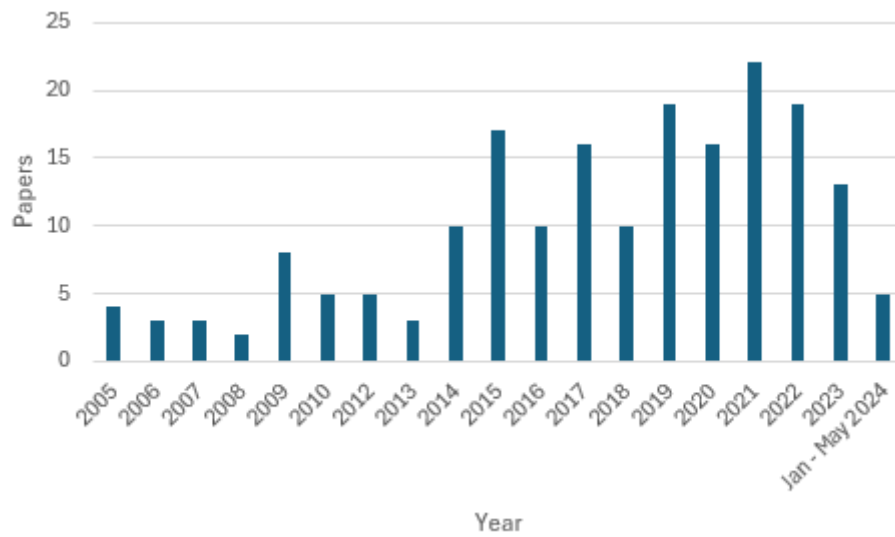


Figure 3.2: Papers published by year (when using SCOPUS search terms from table 3.1)

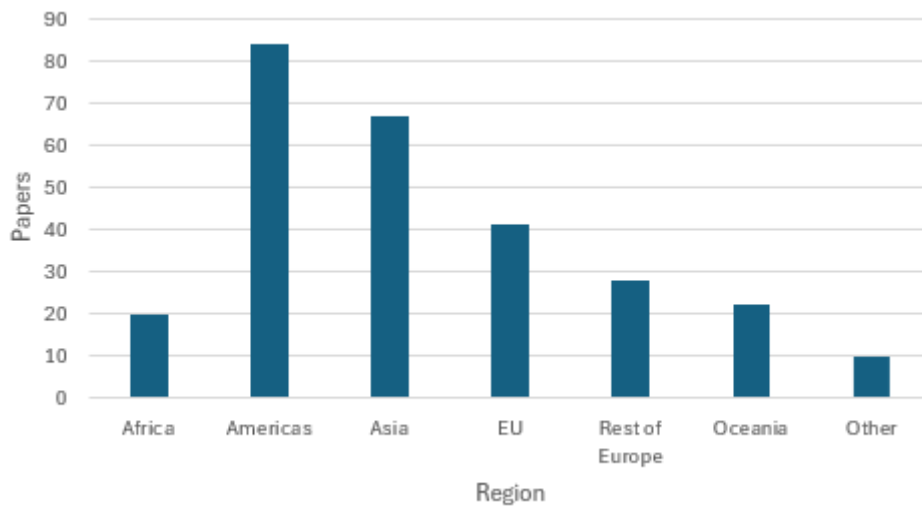


Figure 3.3: Papers published by region (when using SCOPUS search terms from table 3.1)

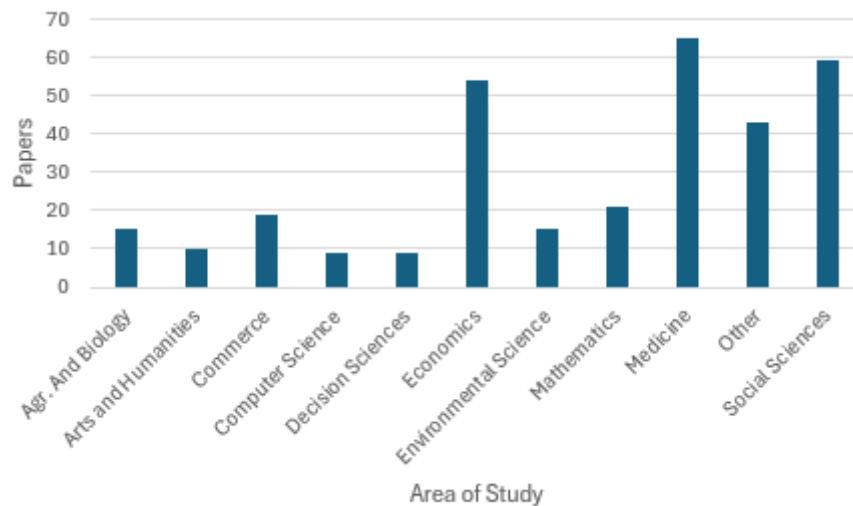


Figure 3.4: Papers published by area of study (when using SCOPUS search terms from table 3.1)

At this stage, the number of papers has been roughly halved, and further analysis has been saved for the detailed analysis section of the work, where the results are notably different from those in the general analysis.

3.2.3 Detailed Analysis

Following the review of the abstracts after going through the exclusion criteria in table 3.2, 15 papers were selected for detailed analysis, and an analysis of these papers, and their results is included in this section. These 15 papers, were read in their entirety, analysed, and grouped together where it made sense to do so, forming the beginnings of the groupings used in the later literature review used in this work.

When looking at the same criteria analysed for the papers as a whole, we can see that the subset of papers selected for detailed analysis is rather different from the general population of papers captured by the search terms. This can be seen in the distribution of papers by year, by country/region as well as when looking at the papers by area of study. Unlike in the previous sections, further areas of analysis were included, as they were captured while reading the papers.

In Fig. 3.5, we can see that the distribution of papers by year is rather different than the general universe of papers captured by the query. The papers in the detailed analysis are much newer (none are older than 2014), and peak in the year 2020. Much like the earlier analysis by year, the even smaller sample size limits how much can be read into the distribution by year.

Similarly to the distribution of papers by year, the distribution of papers by country as seen in Fig. 3.6, is markedly different from that of the pre-screened papers. There are no papers from Africa, and the majority of papers are from Europe. Of the papers from Europe all are from EU or ESS countries, whereas there were a number of non-EU countries in the primary search results. The dominance of the US is also much lower, as compared to the un-screened papers (where a much larger portion were from the US).

The final area of analysis of the papers selected for the detailed analysis consists of the area of focus, as seen in Fig. 3.7. The area of study has been swapped for the area of focus

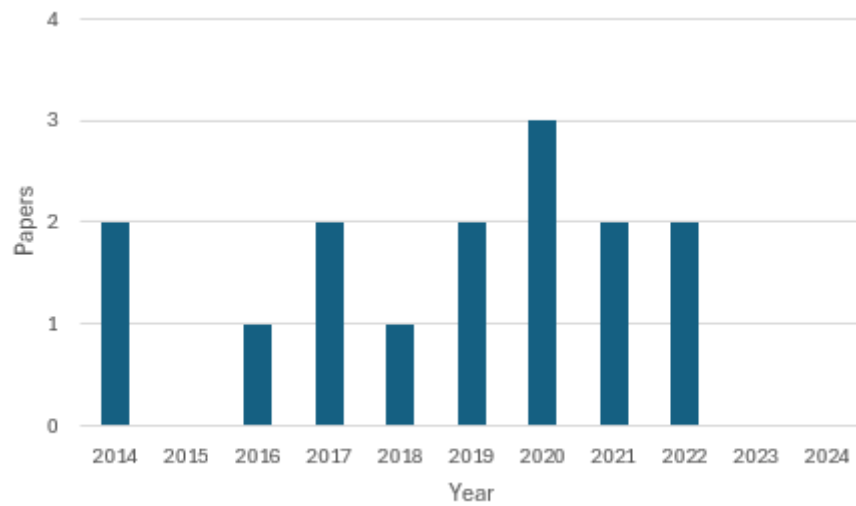


Figure 3.5: Selected papers published by year

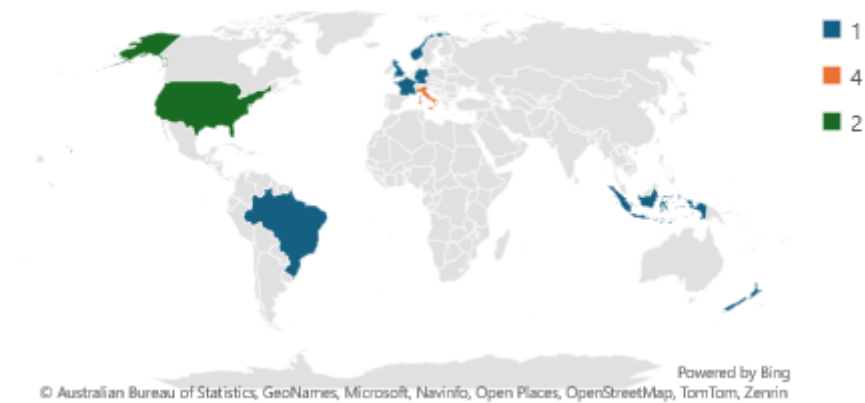


Figure 3.6: Papers published by region

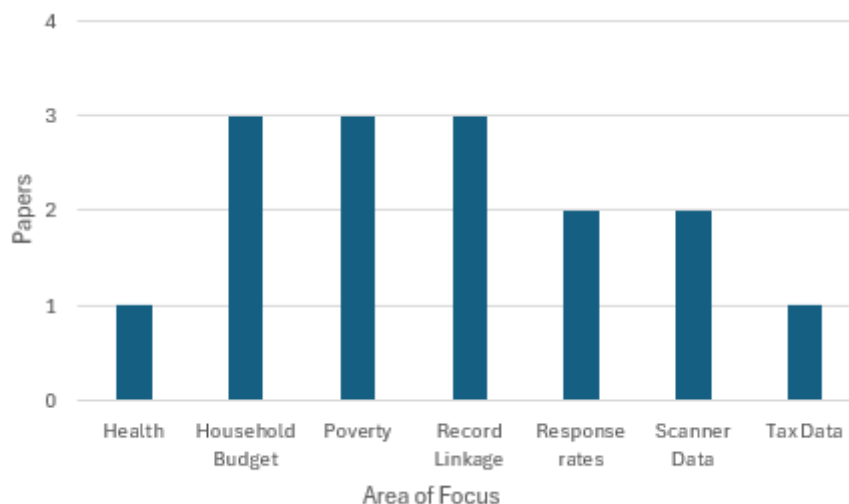


Figure 3.7: Papers published by area of Focus

for the detailed analysis section as the papers in the detailed analysis section are all related to Official Statistics, Household Budget Surveys, or are based on secondary studies of these sources. Looking at the results, Poverty, Household Budgets, and Record linkage are seen to be the most common areas of focus (with three papers each), followed by response rates and scanner data with two papers each. Health and Tax data are each the focus of a single paper included in the detailed analysis.

The abstracts of the selected papers were then re-examined, and the entirety of the fifteen selected papers were read, and parsed to create paper summaries. Based on these summaries, and the areas of focus, they were then used to create the content of the discussion section.

3.3 Discussion

The contents of the papers selected for the detailed analysis, and are presented in the form of a brief literature review, which precedes the discussion of the methods used for the second literature review. These results have also been incorporated in the recommendations section in further detail.

Household Surveys, and other surveys are seen to have falling response rates which do not appear to be fully at random (Browning, Crossley, & Winter, 2014), (Heffetz & Reeves, 2019). In the absence of robust response rates, data linkage can be seen as a way to improve data quality for household consumption expenditures (Eika, Mogstad, & Vestad, 2020), (Kamgar, Meinfelder, Münnich, & Navvabpour, 2020). Data linkage, even in the context of official statistics, is consent based, with variations observed based on income levels (Yang, Fricker, & Eltinge, 2019). Even where consent is given for linkage, access to certain sensitive information may not be available. In such cases, the use of matching criteria may be used in lieu of taxpayer numbers Crosato, Mussini, Mariani, and Zavanella (2014). Consent to data linkage may be higher however, when participants are made aware of the benefits of doing so, and to what ends their data is to be used Ng, Tan, and Tan (2022).

The use of online or scanner data is a growing trend in the compilation of household consumption data, in the context of the HBS, and other official statistical purposes and may

be driven by respondent burden and cost considerations among others, (Haqqoni & Pramana, 2022), (Benedikt et al., 2020).

Household survey data, often from the HBS, is also used as a source, among others for the measurement of poverty, (Rodrigues, Helfand, & Lima, 2018), (Hadj, 2016). Not only can the HBS be used to measure poverty in the traditional sense, it can also be used for measuring energy poverty, (Camboni, Corsini, Miniaci, & Valbonesi, 2021), purchasing power adjusted poverty, (Marchetti & Secondi, 2017), and account for the effects of transfer payments. (Maitino, Ravagli, & Sciclone, 2017). The HBS can also be seen to capture self-reported income data, that may not be properly reported in administrative data sources, (Cabral, Gemmell, & Alinaghi, 2021).

In answering the first research question, there are certainly challenges facing the HBS and other surveys in general, with regards to response rates. The downward trend in response rates is something that NSIs should keep an eye on, and proactively work to address in future iterations of the HBS.

Increasing data linkage, the use of administrative data sources, scanner and online data are definite trends with regards to the HBS. As is the use of the HBS data for purposes other than the direct study of household incomes, expenditures, and consumption.

Though these results are insightful, they are not sufficient in quantity nor variety to create recommendations for the HBS in Portugal, nor for a general HBS. For this reason, broader review was also conducted, with an eye to capturing applicable insights and techniques from official statistics in general, as well as from other areas of study, covering topics of interest that are partially based on the results of the systematic literature review covered in this section.

3.4 Preparing the areas of focus for benchmarking the Portuguese HBS

The benchmarking of the Portuguese HBS undertaken in this work is not systematic in nature, however, the approach taken has been documented in this section. This benchmarking oriented review, focusing more on potential recommendations, focuses more on potential sources of error, new methods, and the practices in other jurisdictions. As such the research questions this benchmarking review seeks to answer are as follows:

- 1) What are the best practices in other countries?
- 2) What are potential improvements to the HBS?
- 3) What are potential sources of error in the HBS?

These research questions are based on the results of the first review, and also informed by the proto-groupings formed as a result of the first review. Due to the broader nature of this second group of research questions, a broader search was conducted, which did not necessarily conform to the process for a systematic literature review, particularly given the more broad objective of comparing the Portuguese HBS to the practices of others. As such, this benchmarking review has been separated from the systematic one, and has a different methodology.

3.4.1 Search

The initial stage, that is the search for papers and other sources, was conducted over a period of three months, and included the results of multiple searches. The process of identifying relevant academic papers for this proposal involved a broad-based approach utilizing various resources. The primary platforms included IEEE Xplore and Scopus as well as PubMed, Google Scholar and Semantic Scholar. These platforms were chosen for their comprehensive coverage of academic literature, particularly in the fields of economics, public health, and official statistics.

An initial step in the search process involved selecting appropriate keywords to capture the essence of the research topic. Keywords such as "Household Budget surveys", "Scanner data", "Consumer Expenditure Surveys", and "Dynamic Surveys" were deemed relevant based on their alignment with the focus of the study. These keywords were chosen to encompass various aspects of household consumption behaviour and survey methodologies, which are central to understanding the current and future possible methodologies of the Household Budget Surveys (HBS)/Consumer Expenditure Surveys (CE).

The search process commenced by inputting the selected keywords into the search engines of the platforms. Initial searches were conducted using the most relevant keywords, with subsequent refinement based on the results obtained. As the search progressed, additional keywords were incorporated based on the terms identified in the papers already retrieved. This iterative process helped to refine the search strategy and ensure a comprehensive coverage of relevant literature.

Given that this benchmarking review was essentially conducted for the specific purpose of producing actionable suggestions, and as Google Scholar was also used in conducting the search process, there was a much larger number of search results, which were not recorded as meticulously as in the systematic literature review. This was not seen to impede the validity of the results obtained, as this review is meant to be less rigorous, in order to broaden the range of results obtained. Though this may seem counter-intuitive, this was decided upon based on the rather limited nature of the field, as seen in the results of the systematic literature review, where there are relatively few papers in the immediate area of study.

3.4.2 Refinement

After searching for papers and obtaining initial results, there was a diversification of the sources used. To enrich the pool of available resources, the search was not confined solely to official statistics sources but extended to related disciplines such as public health, economics, and sociology. This broad approach allowed for a more holistic exploration of the research topic without straying too far from its core focus. Moreover, venturing beyond traditional statistical sources facilitated the discovery of interdisciplinary insights that could inform the study.

Upon retrieving a set of relevant papers, a systematic process of evaluation and analysis was undertaken. Papers were initially screened based on their titles and abstracts to assess their relevance to the research topic. Subsequently, selected papers were further classified based on the themes they addressed and their potential relevance to other papers within the scope of the work.

Additionally, papers of interest were also included in the work, upon suggestion by my advisors. These papers may not have been obtained through the search process described

above, yet they were considered to be relevant to the work, and were thus included. This would not have been permitted in a systematic literature review, further strengthening the reasoning for the separation of this stage of the work from the earlier one.

3.4.3 Analysis

After the papers were selected, the screened papers were then analysed. For each selected paper, detailed notes were taken regarding its key findings, methodologies, and implications. These notes served as the basis for summarizing the main contributions of each paper and identifying potential areas for further investigation. Additionally, key points relevant to the Portuguese Household Budget Survey (HBS) were noted, with a focus on implications and insights that could inform the works' objectives.

After collecting the papers using the keywords, authors, and topics, then lay the task of classifying them into areas of focus based on the methodologies employed, and in how they might be applicable to the household budget survey process. Given the disparate topics covered by the captured papers, multiple attempts were made to classify them, according to both the keywords used, and the methodologies employed by the papers.

The process of selecting the areas of focus and deciding how to create them was somewhat messy and required much refinement. After much deliberation and consultations with the advisors on this work, the number of areas of focus was fixed at five (Methodologies and Data Sources, Data Collection, Use of Administrative Data Sources, Record Linkage, Scanner Data with an additional two mini topics (Online Data and Covid-19), and a miscellaneous one (Other Issues). These areas were defined through a process of elimination of sorts, given the disparate nature of some papers in relation to the rest, and the desire to limit the categories to a reasonable number. In doing so, the Methodologies and Data sources were joined to be a single topic, and the Online Data and Covid-19 were downgraded to mini areas of focus, and the remaining papers that did not fit into the other groups became the rump grouping, that is the Other Issues area of focus. Similarly, though Data collection and Data Sources appear to be rather similar, they are complimentary as opposed to overlapping, in the same vein that Administrative Data Sources and Record Linkage are (administrative data may be used for record linkage, but not necessarily).

The areas of focus presented in the following section represent the final groupings, after selection, and after manual refinement was conducted to categorise the uncategorised papers which did not easily fit into the other categories (methodologically). They are also summarised as seen in table 3.3.

Area of Focus	Short Description
Methodologies and Data Sources	A look at the methodologies of different surveys of interest and how they may be applicable to the Portuguese HBS.
Data Collection	A look at different data collection methods, with a focus on novel and innovative collection methods and uses.
Use of Administrative Data Sources	Covering the integration of administrative data source uses in official statistics and other contexts, and how these may apply to the HBS in general and in Portugal.
Record Linkage	Methods and best practices in incorporating record linkage into surveys and other data sources.
Scanner Data	Examples and uses of Scanner data, with a focus on price data, and those which can be used to reduce respondent burden in surveys.
Online Data	Uses of online data in a statistical context, particularly with regards to price data. This section also looks at how this data can be integrated into the HBS.
Covid-19	Ways in which the pandemic affected data collection, and in some cases, led to innovations in surveying and data collection. These could also reasonably applied to other disasters as well.
Other Issues	Miscellaneous issues which did not fit into any of the other groupings, but nonetheless contribute to the work and deserve consideration in formulating the recommendations.

Table 3.3: Areas of Focus

Chapter 4

Benchmarking the Portuguese HBS in the context of other related surveys

This section contains the discussion of the results of the benchmarking review, and is more expansive than the literature review described in chapter 3 of this work. It includes a discussion of the selected works, their implications on the HBS, surveying and the potential for the integration of cross-disciplinary approaches into the next iteration of the HBS in Portugal. These works have been divided into areas of focus to aid in the understanding of the diverse works covered. The areas in question are also the titles of their own respective sections and are as follows: Methodology and Data sources, Data Collection, Use of Administrative Data Sources, Record Linkage, Use of Scanner Data, Use of Online Data, Covid-19, and Other Issues/Topics of interest. Grouping the results of the benchmarking review into these areas involved an analysis of the papers selected in this review, and the purpose was to allow for papers which resulted in similar recommendations to be grouped together. In this way, the selected papers are from differing fields of study and jurisdictions, yet may be more easily understood in the context of the HBS and their relation to it (if only in terms of the recommendations they led to). Originally, there were additional areas of focus, but Methodology and Data Sources were merged into a single grouping, and the remaining papers were grouped into the Other Issues/Topics of Interest area of focus. Of particular interest is the latter grouping, which allowed for the inclusion of papers not directly related to the HBS/CE, or relating to general trends and data uses.

4.1 Methodologies and Data Sources

The methods in which Household Budget Surveys are created, calibrated and designed, that is their methodology is of interest and a good starting point for those unfamiliar with the HBS. An overview of EU-SILC methodologies and processes, as seen in Wirth and Pforr (2022), was a good starting resource to consult in reference to the methodological differences among EU countries in the context of EU-SILC. These differences are explored further in other sections of this review.

Reviewing the methodology of the existing iteration of the HBS, the practices were found to be as expected, however not necessarily keeping in line with the trends in increasing non-response as seen in Braekman et al. (2019) and Meyer, Mok, and Sullivan (2015). In the Portuguese context it would be of use to have more information on the corrections for non-

response, as this appears to be briefly addressed in INE (2022), but does not appear to account for differential non-response rates.

Another good example of the methods used in an HBS (outside of the Portuguese case) is the SOEP of Germany. Strictly speaking, the Socio-Economic Panel is much more comprehensive than a household budget survey, in being more similar to a cohort study, (Goebel et al., 2019). The methods used however, to reflect the changing demographics of Germany through unification and successive waves of immigration is of great interest to the study of HBS (unlike say grip strength measurements also collected). The methods seem rather straightforward (oversampling of the target populations) but provide for a European example of this process that is compliant with Eurostat guidelines (as opposed to trying to adapt North American ones for example).

In an example from across the Atlantic, Parker, Souleles, and Carroll (2014) takes a look at the role played by the Consumer Expenditure Survey (CE) and panel data in general in the sphere of household data for the United States. Particularly, the case is made for the continued use of panel data, and the particularity of the CE being one of the only sources of official statistics of such in the United States. The case is made that the panel data greatly enriches the CE, and although the use of other data sources may be used to enhance or supplement this, the loss of the panel data would be harmful to the CE.

Taking a look at developing world contexts, Conforti (2015) looks at food consumption in the context of food security. The HBS measures consumption in terms of purchase behaviour, but as mentioned in the work, this is not actually equivalent to actual nutritional intake of the purchased food. As food spoilage is a known issue in developed countries, this could lead to an under-count of malnutrition among the population as mentioned in the work. Another point of interest is the seasonal variation in purchases, which might be of interest in more rural areas of the country where households might have higher consumption than reported in the HBS as some foods are grown/made without market purchases (kitchen gardens, orchards or hobby farms/allotment gardens). It would be interesting to see how these might be accounted for in the HBS.

4.2 Data Collection

Data collection is integral to the production of official statistics. Even in cases where administrative data is being used, the administrative data must often be collected from differing sources, and then transformed into the necessary format for use, especially when being used for more complex statistical products (such as surveys or censuses). The Household Budget Survey, or equivalent Consumer Expenditure Survey in the United States, is a valuable tool in understanding the income sources and consumption habits of households. It is not as concerned with assets as the Household Financial surveys and does not collect information on prices in the way that price indices do, yet in the context of the CPI, it is used to understand the consumption patterns of households, such that a consumption basket may be created. Data collection is a major task unto itself in official statistics, as is the verification of data quality. In producing official statistics, it is imperative that the data quality is monitored, and maintained at a standard befitting official statistics or otherwise include a proviso regarding the specific caveats or limitations in the data.

The issue of under coverage is a critical one in the case of official statistics, with a failure to accurately capture demographic data possibly affecting policy and fiscal decision-making.

As seen in Amaya, Zimmer, Morton, and Harter (2018), there is the possibility that using an address-based sampling frame as INE does, can potentially lead to coverage bias, as coverage discrepancies are not uniformly distributed among demographic groups (with specific issues of under coverage for more socioeconomically disadvantaged groups).

Another area of interest is the effectiveness of respondent recall in the context of an HBS, especially with regards to smaller or more frequent purchases such as food. In Sekula et al. (2005), recall data is compared to the HBS in Poland. The study tries to account for seasonal differences by looking at the same periods of time (in the autumn), however differences were found between the HBS and recall data. With some items, differences in the methods (consumption vs purchases) caused the errors in cases where a sizeable percentage of purchased goods were wasted. There were also potential issues with recall of specific ingredients used (such as flour), and biases towards reporting the consumption of higher prestige foods (and the contrary for lower prestige ones). Overall, however, the HBS was found to be generally representative of food consumption as seen in the recall surveys. In relation to the Portuguese case, the Polish survey is somewhat outdated and not necessarily analogous to the Portuguese HBS but it does highlight some important possible issues.

In Greg and Stockburger (2022), the CE is looked at as a source for some of the information previously collected by the Telephone Point of Purchase Survey (TPoPs). The applicability of this, and the potential for increased burdens on the survey respondents were considered, and it was determined that the CE data was compatible, but that not all the questions asked through the TPoPs needed to be added to the CE in light of this. The TPoPs was discontinued after 2019, and the information collected about the location of consumer purchases of products which make up the CPI basket are now collected using the CE. In light of this, and the comparability of the CE and HBS, it is possible to consider streamlining existing survey procedures in favour of a more comprehensive HBS, helping to avoid duplication in data collection.

Looking at a different perspective, Murphy et al. (2023), investigates the use of a pictorial diary in lieu of a survey, which is an intriguing if uncommon data collection method for such a survey.

4.3 Use of Administrative Data Sources

Administrative Data refers to those collected through administrative means, i.e. not originally for statistical purposes. Traditionally, these have not been utilized to their full potential, and NSIs have often relied on Census and other survey data. Given the improvements in administrative data coverage (birth and death registrations for example are close to complete in ESS countries, but may be lower in many developing nations), using these data sources is a valid alternative to collecting data for statistical purposes only, and in the process, duplicating both efforts and datasets. Of note however, is the need to combine data sources, and very often combine them, in order to produce population statistics. Given increases in computational power, doing so is no longer outside the realm of possibility, and is increasingly, the reality for many NSIs.

Of further interest, and certainly more pertinent to the Portuguese HBS, is a look at administrative data use in the European context. Though not homogeneous culturally, economically, or socially, European Statistics, or at least those from the ESS, broadly follow Eurostat guidelines and the GSBPM in producing statistics, and in this sense, make for easier

comparisons to data from other countries in the ESS.

An interesting use of the consumption data is as a proxy for income when studying inequality at the household level as seen in Galli and Rosenblatt-Wisch (2022). For this use, a modified household budget survey in addition to tax and wealth data from administrative sources, could be used to calculate inequality, poverty and other social welfare measures currently calculated separately. Overall, the use of tax and wealth data as a possible supplement to the HBS, particularly with regards to the income and consumption components presents a possible area of further study, with the comprehensiveness and the coverage of these records in the locale of study being a limiting factor in its applicability.

Another ESS example, and one using the EU SILC, can be found in Angel, Heuberger, and Lamei (2017). As seen in Blanchet, Flores, and Morgan (2022) and Abildgren, Kuchler, Rasmussen, and Sørensen (2018), the use of registers can improve the coverage of both the lower and the higher ends of the income distribution when compared to survey response data. Seeing as these results have been broadly reproduced in the American context as well as those of multiple EU countries in the two works cited above, it is likely to be similar in the Portuguese case as well. Interestingly, this work also looked at employment/disability (with regards to the inability to work or severe illness) in addition to simply looking at income data. This work brings up the issue of desirability bias as a possible source of survey error, as opposed to simply studying biased non-response rates between demographic cohorts (as was seen in Sekula et al. (2005) as well).

Similarly, a look at the use of registry data in the case of Sweden can be seen in Kolsrud, Landais, and Spinnewijn (2017), where consumption data is used to identify key life events. In the context of the HBS, this is pertinent, given the questions on events such as retirement, disability/major illness, and parenthood asked to respondents. As survey data may contain errors due to several factors, the ability to identify these and other life events among the population could aid in improving the accuracy of survey data.

Aside from just looking at the use of registry data, Abildgren et al. (2018) looks at the consistency between registry and survey data in terms of household consumption. This is of great interest, being another ESS example of the use of register-based versus survey data for household consumption. As with any source, there are differences between the two, as discussed in this work, focusing on the Danish context in the recent past. The two were found, in the Danish case to be broadly equivalent with slight differences in select cases such as the highest and lowest income households.

The ability of tax data to provide increased coverage of income data that may not be sufficiently covered through survey data is of great salience to the review of the HBS. Blanchet et al. (2022) provides a look at the way in which current survey methods fail to sufficiently cover the upper tail distribution of incomes (such as the top decile or percentile), and how this is not necessarily corrected for when using tax data. The distribution can be estimated for the upper tail of income distributions if there is sufficient coverage in the form of population micro-data. The study looked at three European countries and two South American ones (Brazil, Chile, France, Norway, and the UK) and compared the estimated distribution to that found in the tax data. This, however, does not eliminate the discrepancy caused by tax exempt income (such as non-taxable foreign income or when taxes are reduced due to tax credits), or for illegal income, or unreported income (tax evasion). Thus, It should not be assumed that the unreported or under-reported income is insignificant, and further adjustments might need to be applied to reflect income more accurately. The study assumes that the differential

responses rates are not necessarily due to voluntary misreporting in surveys and does not account for this in the corrections it proposes to income survey data. The corrected income distributions showed that average incomes were higher than seen in the survey data, as was income inequality, to varying degrees, with the more unequal countries (Chile and Brazil) showing much higher corrections at the upper tail of the survey income distribution (and assumedly for the actual distribution of incomes in the population as a whole). As a result, these countries also have higher levels of income inequality when using the corrected data, as compared to simply using the survey income data.

Proposing that the failure of surveys to capture the highest incomes when compared to tax data is not novel, yet the idea that the income percentiles at which they begin to materially diverge as seen in Yonzan, Milanovic, Morelli, and Gornick (2020) is rather intriguing if unsurprising. Different countries have differing levels of income inequality, economic, social and cultural contexts, as well as differing data collection methods.

The taxable unit and definition of taxable income may differ by jurisdiction with some countries allowing joint tax filing while others exempt certain categories of income from taxation (causing their exclusion from tax data). Given that many countries have taxable income thresholds and available percentages of non-filers of income tax, the tax data can be seen to exclude much of the lowest income segment of the population, at varying levels between jurisdictions. As higher income percentiles may have a differing mix of labour and non-labour income, this might be something to account for in future surveys (as it appears to have less coverage when compared to tax data).

Providing a look into the use of administrative data for a HBS that currently uses traditional survey methods, Brummet et al. (2018) provides the perspective of the BLS in the United States. It is of interest that racial disparities in income and among age groups were reported in this working paper. Of interest to other statistical research is the nature of said disparities with regards to the data sources. In the American context, it was found that there were disparities in the difference between income as seen in CE data, and IRS data between demographic groups.

Building on the use of administrative data in the CE, Steinberg (2020) looks at correcting for the differential non-response rates between demographic groups that might possibly skew it's results. The process in which the non-response is accounted for is thus rather important in ensuring the continued representiveness of the surveyed population as a sample of the entire population. In this sense, the method of accounting for the differential non-response rates is relevant to any study of the CE survey. Said method involves re-weighting the sample based on administrative data on income, and subsequently using this to make an adjustment for the non-responses.

An interesting point raised in Korinek, Mistiaen, and Ravallion (2005) is the opportunity cost for a higher income household to be filling out the HBS. Given the thorough nature of the Portuguese HBS, and the likelihood that respondents would have to spend time preparing information in providing minutiae such as bank account fees or household uniform expenses that are unlikely to be known by a respondent without a review of their expenses, this should not be discounted as a possibility. The population share in the uppermost part of the income distribution as observed using the HBS is lower than the actual population share of the upper tail of the income distribution. Similarly, the poorest are over represented in the HBS compared to the general population. Given the policy implications of this, and the corresponding increases in measured income inequality, these could potentially have a measurable impact on

social policy.

Myck and Najsztub (2014) take a look at the HBS for Poland compared to a selection of available administrative data sources. Like other works, a lack of representation is found at the upper and lower tails of the income distribution in the survey data, which does not appear to be fully corrected for. The problem of the missing-rich is also looked at and adjusted for using income tax data.

The use of administrative data in lieu of survey data is not a novelty, being an established practice in many northern European nations. The use of administrative data as an auxiliary data source to augment survey data however is an area of more recent study. In accepting that survey non-response and selective non-response to particular questions is non-random puts the imputation procedures used to correct for this in surveys under scrutiny. Much literature on the subject has shown that administrative data can help with income measurement, but often vary in their methods, with some previous works focusing more on the survey non-response aspect without addressing selective non-response to questions or misreporting by participants as seen in Meyer and Mittag (2019a).

4.4 Record Linkage

Record linkage in the context of this work, refers to the linkage of records from differing data sources based on overlapping identifying characteristics available between data sources such as a name, identity number et cetera. In the context of official statistics, record linkage helps to augment the available data sources, by enabling multiple data sources to be combined. In the case of administrative data sources, this might involve the combination of an existing data source with data from a survey, or another administrative data source.

Though the benefits of record linkage are large, there are potential issues with regards to record linkage that should be considered prior to its implementation. These might include issues relating to privacy, data completeness and data access among others.

Meyer and Mittag (2019b) look at social transfers and the way in which they may be under-reported by studying a population in New York state. In inaccurately measuring transfer payments to low-income individuals and households, surveys may inadvertently be overestimating poverty (after transfer payments) among households. This is even more so in the case of non-cash or cash analogous benefits such as food cards, or housing assistance (in the form of vouchers or subsidised housing). Linking the administrative records is imperative to properly assess households from different sources and compare them to survey data.

An EU example of a similar work can be found in Lohmann (2011), which looks at the compatibility of EU Survey of Income and Living Conditions (SILC) data with those obtained from other sources, as well as the methodological differences between countries. An interesting instance of this being discrepancies between employment and income data. In a register-based system one can be receiving income without necessarily being employed as this data is collected from multiple sources (a good example might be investment income), whereas in the survey-based countries this is unlikely to occur (though passive income streams such as rental income, royalties, interest income and dividends could potentially cause someone to be listed as unemployed while collecting income that is not governmental benefit income).

Additionally discussed is the use of proxy-based interviews and the changes over time in their frequency. As many survey-based interviews rely on proxy interviews (where one individual answers on behalf of others who are not interviewed, with regards to the HBS

this would be other household members), this is of great relevance to the HBS as changes in their frequency, and in the accuracy of reporting on household members can greatly affect the quality of data obtained through proxy interviews. As seen in other works, it is plausible that accuracy will vary based on the question being asked, and the involvement of the proxy with household finances.

Looking at the fusion of multiple datasets through statistical matching would be useful to INE, especially the work in Osier (2023) done on matching EU SILC and HBS data. The large Portuguese population in Luxembourg also reduces possible cultural factors that may impede this approach (as well as both countries belonging to the EU and ESS). Additionally pertinent to INE are the ethical considerations regarding the use of auxiliary data sources, as studied in Struminskaya and Sakshaug (2023). It looks at these concerns and ways to address them, the attitudes of those whose data is being collected, and the reasons for their beliefs (which can be useful when considering how to best frame requests for data linkage consent, or the importance of properly explaining privacy protections).

Looking at the various causes of non-response and other survey errors, but more specifically the reasons behind the decisions made by respondents, Sakshaug, Couper, Ofstedal, and Weir (2012) provide an interesting perspective on the non-response issue. It is best practice (and often a legal requirement) to obtain consent to link survey records, yet respondents in most cases are not required to do so. The collection of official statistics remains, in many cases, an exception to this, yet in keeping with the principles of informed consent, open government, as well as improving trust and transparency in the data collection methods for official statistics, it is paramount that respondents are made to feel that they have agency, and that they are willing to provide consent to data linkage. It would be advisable that this be studied further, in light of the upcoming iteration of the HBS in Portugal, with a special focus on the intricacies of the Portuguese context, which may differ from that in other European countries, and likely do in some ways from the American one.

Linking pension (or employment insurance) data to household surveys can provide additional income data (including income history), that can be of great interest as seen in Lüthen et al. (2021). In doing so, it is important to obtain appropriate consent and take appropriate data-security and privacy related measures to safeguard sensitive information that participants share (in the Portuguese case, social security numbers, and income data). It should be noted that consent is not a given, and that the level of trust may be a factor in willingness to provide social security information (permission to link records). Theoretically, this is not required per se, if collecting this information for official statistical purposes but would be advisable to ensure trust and a certain sense of agency among respondents. Overall, social security data appears to make a good complement to household survey information, and this should be explored further.

4.5 Use of Scanner Data

In lay terms, scanner data is data which is collected at point of sales terminals and represent sales of goods or services, (Basker, 2012). The name comes from the now standard practice of using scanners to read product identification information from bar-codes but may not necessarily involve a scanner (such as online purchases). Though helpful for understanding the concept of scanner data as price/sales data, this is not necessarily the definition, which is in use by NSI's, which may use differing definitions of scanner data.

Given these differing (though similar) definitions of scanner data in the context of official statistics, it is important to understand what exactly is being referred to by this concept. In the context of this work, the definitions would be either the Nordic or the Portuguese ones, depending on the context, unless otherwise stated.

Scanner data can be seen as an excellent data source on purchases and consumption behaviour, which is itself only a positive side-effect of the positive disruption of the retail industry caused by the introduction and widespread adoption of bar codes and scanners in the 1970's and onwards, (Basker, 2012). The introduction of scanner technology led to measured increases in productivity in the retail sector, and it is likely that this will apply to the production of official statistics as well, in the cases where it is not already being used.

At its most simple, a bar code simply allows for a product to be identified using the code, which can then be matched to a product in the database, and then lookup the price. Though seemingly simple, this allows for detailed keeping of inventory, simpler price adjustments, and the automatic calculation of discounts. It also allowed for a much faster checkout process at cash registers and is now allowing for the implementation of self-checkout, (Orel & Kara, 2014).

Scanner data is increasingly used in official statistics, both as a primary data source, and to test the accuracy of data collected in more traditional ways. In this sense, the increasing adoption of scanner data for non-traditional applications, that is, outside of the compilation of price indices and the CPI.

With regards to the CPI, the potential uses of scanner data abound. Traditionally, CPI calculations involved manually collecting samples of price data from samples of retailers and was generally a laborious process (especially before the advent of scanners and barcodes for product lookups). Scanner data allows for the collection of this data (and more), without sending individuals to manually collect it, as retailers already have this information on hand (and are not placed under a heavy respondent burden by providing it). Not only does scanner data reduce costs, and collection time in this sense, it can also greatly increase the frequency of data collection, and possibly comprehensiveness, and the frequency at which price statistics are published as well, (Cavallo & Rigobón, 2016).

Though clearly of great use in the collection and verification of price data, scanner data has uses beyond those which might be most easily associated with it previously. Increasingly comprehensive datasets on consumption allow for big data applications that were not previously possible due to lack of data, resources, or computing power, (Cavallo & Rigobón, 2016).

A household budget survey is generally known to collect information on household finances and consumption patterns, whether through direct or indirect means. Traditionally, this has been done in the form of a survey administered to a sample of households over a pre-determined period, after which a new survey period with new samples and revised questions begins. In this sense, a traditionally administered household budget survey might not be as robust in detecting changing consumption patterns in case of a sudden and significant change in consumption patterns or incomes, as occurred during the Covid-19 pandemic, (Leigh, 2023),(Bounie, Camara, & Galbraith, 2022). With regards to frequently purchased items (food and other consumables), recall may not be as high as desired, and this might unnecessarily add to respondent burden. In this vein, the addition of scanner data for high consumption items (fresh food, bread, grains, meat, alcohol, toiletries), might both reduce respondent burden, and help improve the accuracy while lowering associated survey costs.

The use of scanner data in calculating CPI is already an established practice in several countries, (Laureti & Polidoro, 2022), (da Silva, de Oliveira, Dantas, & Miranda, 2019) , with adoption beginning with the NSI's of the Nordic countries, (Tongur, 2019). Though the CPI is generally thought to have a fixed basket of goods, which is periodically revised, and can be used to formulate some of the questions on the HBS, alternative methods of revising said basket are of interest. In particular, the use of scanner data not only allows for differing calculation methods, but in some cases requires it.

Methods used to improve the accuracy of the CPI using scanner data are likely to have a degree of applicability to the HBS as well. Sweden for example, has long incorporated scanner data into their calculations of the CPI. In the use of scanner data, there exists a challenge in maintaining the CPI's fixed basket approach. Since the fixed basket approach, which tracks the price changes of a predetermined set of goods and services over time, is fundamentally important in ensuring the compatibility of CPI calculations, the use of scanner data can complicate this process, especially regarding the handling of product replacements and adjusting for changes in quality and quantity. The dynamic basket approach allows for continuous updates to the basket, using price ratios of exact matched items between adjacent months, allowing for updated sample coverage but also creating challenges with regards to chain drift. However, these adjustments to the basket are crucial in preserving the comparability of the CPI over time and between regions, (Tongur, 2019). The paper highlights the significant variance in inflation rates that may arise from improper quantity adjustments in scanner data.

Though focused on the basket used to calculate the CPI, the work relating to the adjustment of the fixed basket can certainly be used with regards to the HBS, particularly when revising the product specific expenditure questions on the survey. In a similar vein, it is likely that the introduction of scanner data to the HBS is likely to require adjustments such as those made to the CPI, to adjust to the differing nature of the data source as seen in Radjabov and Ferring (2021), Bialek (2023a), and Bialek (2023b).

Bialek (2023a) presents an in-depth examination of how scanner data can enhance the accuracy and reliability of Consumer Price Index (CPI) calculations. Scanner data, which is detailed transaction data collected from retailers, encompasses information at the barcode level, including prices and quantities of each sold item. This data, when utilized effectively, promises to overcome some traditional limitations faced by CPI measurements, particularly those associated with chain drift bias and substitution bias. The paper identifies and explores the use of multilateral index methods as a potent solution for the challenges posed by dynamic scanner data sets. Unlike traditional bilateral indices that compare current data with a fixed base period, multilateral indices consider all available data within a specific time frame, making them particularly suited for the dynamic nature of scanner data. These indices are praised for their transitivity, a property essential for eliminating the chain drift effect, which is a common problem when using scanner data for CPI calculation.

Similarly, with some exceptions, price indices, and their related basket of goods are often calculated at the national level, but with sufficient data collection, they could be at a regional level as well. The implications of this in terms of the CPI are obvious, especially when there may be regional differences in diets and lifestyles within a country yet may not be directly so in the case of the HBS. Considering that the HBS directly asks respondents about consumption, including for food and other household goods, the ability to more accurately account for potential regional differences in consumption patterns is appealing. Scanner data offers a simpler and more cost-effective way of doing so than simply augmenting existing surveys

without increasing respondent burden (in the form of questions asked).

Originally looking at the case of Italy, and its notable North-South divide the work Laureti and Polidoro (2022), seeks to create sub-national price indices. These looking specifically at the North-South divide, but also NUTS II and III regions. In the Portuguese case, these would logically look at Northern Portugal (Norte + Centro), Southern Portugal (Lisboa, Alentejo, Algarve), and the Islands (Açores + Madeira), and possibly each NUTS II region separately. In the context of the HBS, creating new price indices for each is not required, yet the creation of regional consumption baskets could possibly aid the HBS, whether done in conjunction with the calculation of the CPI or not.

In the case of the CPI, and the HBS, household food costs are generally estimated using survey or scanner data. Another potential source of this data could be studies of the food supply in a country, or region. Though less direct than simply asking survey respondents for this information, it is of potential use, when considered in the context of populations or sub-populations which may have lower response rates to traditional surveys or suffer from under coverage issues. One such group is those of lower incomes, (Amaya et al., 2018).

The CPI coverage of total diet costs in Canada can be considered adequate though not complete, with variances based on geography and income levels among other factors, (Lungo, Tarasuk, Yi, & Mah, 2022). This work matched nationally representative dietary recall data from the 2015 Canadian Community Health Survey-Nutrition (CCHS-N) with food prices from the 2015 Canadian CPI. The sample covered Canadians aged one and older, covering a sample size of 20,487 Canadians. Food product categories other than water derived from the CCHS-N were then matched to the CPI's average retail items priced in dollars per gram, either directly in the case of exact matches, or indirectly in terms of comparable matches. The study uses both dietary recall data and CPI data, providing a look at the coverage that the CPI provides in terms of dietary intake in Canada. On average CPI was found to cover 76.3 percent of total dietary intake (excluding water) by weight.

Scanner data and the CPI have also been used to calculate product demand elasticities as seen in Palmer (2019).

While looking at consumption, income, and expenditure at an aggregate level is common practice, the HBS is more interested in the situations of the individual households under study as a means of understanding the overall situation among households, than simply the aggregate results.

Looking at Inflation at a household level is an interesting concept and has been explored by Kaplan and Schulhofer-Wohl (2017). Their study leverages detailed scanner data, encompassing 500 million transactions made by approximately 50,000 U.S. households from 2004 to 2013, to meticulously calculate inflation rates at the household level. This approach unveils a significant annual dispersion in household inflation rates, with an interquartile range of 6.2 to 9.0 percentage points, highlighting that most variance arises not from differences in the consumption bundles but from variations in prices paid for identical types of goods, (Kaplan & Schulhofer-Wohl, 2017). Given the differences in inflation among households, the implications in terms of economic policy-making are evident, as are the potential uses in terms of using CPI data for the same. If indeed inflation does vary at the household level, and more specifically, between higher and lower income households, there are likely to be implications for the HBS.

Furthermore, lower income households are seen to face higher rates of inflation. Additionally, differences in inflation rates for households seem to be caused by differences in

prices paid for products, relative to the median, as opposed to fluctuations in inflation. Assuming that inflation impacts are felt equally by households has been a long-held assumption in studying the CPI, and as such, this finding invites further scrutiny of the impacts on household expenditures.

As the HBS is concerned with the expenditures and incomes of households, differences in expenditures for the same products (in terms of prices paid), are of interest to the HBS. Similarly, differences in inflation levels experienced by households based on income levels suggests that there might be scope for increased study of household expenditures.

Results obtained in the American context may or may not apply to the European context, given the possibly differing nature of the European retail landscape and consumption patterns. Similarly, further study is likely required before changing assumptions about the nature of inflation among households in Portugal, and the changes that this might require of the HBS. If inflation levels were found to differ and do so based on observable factors such as income, it is likely that imputing expenditure data based on median expenditures may not be the correct plan of action for missing responses.

In the context of the HBS, changes in prices and quality adjustments made at a household level are of more interest than those at an aggregate level, such as when measured using the CPI. In this sense, the work on household level inflation can be seen as further underscoring the continued necessity of household surveys, given that consumption and expenditures may differ greatly from what population measures might suggest.

4.6 Use of Online Data

Online data collection represents a vast font of data sources for official statistics that were previously uncollected, or possibly un-collectable. From obvious sources such as transaction data and web traffic data to more specialised and tailored sources such as online surveys, there are numerous possibilities for the incorporation of online data sources in official statistics. Given the large amount of personal information also available, and which may inadvertently be captured, special consideration must be given to maintaining adequate privacy protections when collecting such information.

The use of web scraped price data offers an interesting and relatively easily applicable model for price index calculations for an NSI. Web scraped price data is not proprietary to retailers and can be obtained without many of the same concerns that may arise with transaction and scanner data. There are not any obvious privacy concerns, as consumer information is not collected in the process, in the same way that the statistical burden on companies is exceedingly low (most will not have to do anything at all, but if they employ protections against web scraping, they could be obliged to provide a link to their retail site with the blockers removed, or by whitelisting the NSI scraping program). Prices could be updated as soon as they are on the retailers' sites and integrated into price indices. The use of web scraped prices as a proxy for those collected from physical stores, is an interesting prospect for statistical agencies, especially if online price data is seen to be a good substitute for traditionally collected ones. The use of online price data also helps with the measurement of quality changes and can offer more frequent data, (Cavallo & Rigobón, 2016).

When looking specifically at the HBS, web scraped prices could be used as prompts for respondents, who may or may not recall the prices of smaller or automatically billed purchases. Web scraping could also be used to find salary data for new job openings. For certain

categories of purchases, such as travel (flight and hotel bookings), many purchases are already made online, and this has been seen to increase over time, (da Silva et al., 2019). Looking at CPI calculations rather than those for the HBS, the methods used, particularly looking at web scraped airfares in the same work could be of use to the HBS. When looking at occasional costs that not every family might have each year, it is possible that recall might be sub-optimal regarding prices. Web scraped data can serve as a good benchmark for this/and as an aid in recall.

In using web scraping to create a list frame of farmers' markets in the United States, Young and Jacobsen (2021) employs a method not commonly associated with human demographic studies. Capture-recapture is a technique often used in the field of animal population studies, as learned in many an introductory biology class. Aside from this, for the purposes of sampling farmer's markets or other businesses, it appears that this method could be adapted by other statistical agencies as well. In the context of the household budget survey, the utility might be somewhat limited, unless looking at some of the physical locations where consumers make their purchases (such as seasonal or farmers markets that might not otherwise be included in scanner data collected from the supermarkets).

The concept of Jäckle, Burton, Couper, and Lessof (2019) is an intriguing one, while rather straightforward, it would simplify the HBS significantly if implemented on a larger scale. Using an app where respondents can directly scan their purchase receipts or log their purchases would provide a large trove of detailed data that could be of immense value to statisticians. On the other hand, as mentioned in the work, it would change the nature of non-response from binary to a more nuanced type. It would be harder to account for non-response by respondents, especially in cases where they are due to technical difficulties with mobile technology.

Some EU countries use web-based data collection as a supplement to traditional methods for the European Health Interview Survey, and this study looked at the differences between online and offline response rates. The results in Braekman et al. (2019) do not bode well for online only methods for the HBS but do hint that this can be used as a complementary source of data, particularly for younger respondents.

In referencing Minnen, Rymenants, Glorieux, and van Tienoven (2023) the diary keeping aspect of time use surveys does bear some similarity to expenditure surveys. Additionally, the time use of an app/online method for data collection offers an insight into possible supplementary data collection methods for household surveys. Among those comfortable with technology use and old enough to be filling out household surveys (gen z, millenials and gen x et cetera), this could represent an easing of the statistical burden compared to traditional survey methods. It is also possible that the survey could be offered in multiple languages using machine translation for the online survey (and possibly verified using community volunteers). The change in processes required by adopting a Modular Online Time Use Survey (MOTUS) like method (online data collection of survey responses) for the HBS could also be accompanied by methodological changes to collect information (such as Meta and Para data mentioned in the work).

Building on this, and referencing papers such as Côté et al. (2020), not directly related, but offering insights into the use of desired techniques for other purposes can add differing use cases and reduce the silo effect when overspecialising. Given the links between nutrition and the HBS, particularly in relation to the socioeconomic data collected within the remit of EU-SILC, the use of an online-only survey would be of interest to NSIs. The focus on those

of low-socioeconomic status is also of interest given the issues of representation of both the very wealth and those of the least means in household surveys. Although not directly related to HBS methodology, online price data nonetheless may be used for the calculation of the CPI and other indices as seen in Benedetti, Laureti, Palumbo, and Rose (2022).

4.7 Covid-19

Covid-19 represented a massive challenge for official statistics, with massive changes in the economy, travel, and people's way of life. These disruptions would appear self-evident in countries where large scale lock downs, travel restrictions and travel bans caused people to work from home where possible, avoid unnecessary travel, and begin purchasing more online (Bounie et al., 2022). The Covid-19 Pandemic led to rapid changes economically, socially and in some cases demographically in many societies, (Kühne, Kroh, Liebig, & Zinn, 2020). These changes ranged from the temporary closure of borders causing dramatic falls in tourism and immigration, to work from home policies which led to large declines in public transit usage. Traditional statistical reporting practices in some cases were found to be inadequate in the face of the rapid changes imposed by the pandemic, often defying many long-held assumptions.

Australia was affected by these changes, and as any other country, had to adapt to reflect these. To adapt to these changes, the Australian Bureau of Statistics made several changes to their reporting and data collection practices. Broadly speaking these changes involved shortening the reporting time for various statistics (deaths, unemployment, migration, and the CPI for example), to better reflect the rapidly changing situation, (Leigh, 2023). Shortened reporting times, and the gradual move towards 'now-casting' for certain statistics help better reflect the changes in society that have taken place during and following the pandemic, but may be of use in the future, when there are further disruptive events of a similar magnitude.

Bounie et al. (2022) wrote an extremely interesting paper with respect to the HBS update, looking at French payment transaction data for the same 51 weeks in 2019 and 2020, from all major card issuers in France (similar to Portugal, the national cards processing is done by a domestic consortium run by domestic banks). Unsurprisingly, the card data captures the shift from in-person purchases to mostly online ones, over the course of several lock downs. A significant fall in travel is also documented, in terms of cards being used away from their city of issue, or in a foreign locale. The applicability of card purchase data is of great interest as it was shown to be rather accurate to gauge both consumer spending patterns and economic sentiment. The ability to differentiate purchases as online or offline, or local/non-local would allow for further study based on these classifications.

With regards to the CE surveys in Ash, Nix, and Steinberg (2022), it was found that though there were some slight differences in responses and response rates from before and after the COVID-19 pandemic, these were not necessarily significant, or related to the pandemic itself (such as an end to in-person surveys leading to a difference in home ownership rates captured in the survey).

The use of ad-hoc panel surveys to supplement an ongoing one in the face of a dramatic change in societal circumstances as seen in Kühne et al. (2020), with relation to the Covid-19 pandemic is relevant to any NSI, in particular, those that are prone to natural disasters and other such disruptions which may impede regular statistical data collection.

In Seiler (2020), the impact of COVID on a possible under count of inflation resulting from a fundamental change in consumption patterns not picked up by the regular CPI basket

is studied. In terms of the HBS providing for alternative consumption baskets would allow for continuity of data collection, with a more targeted focus on consumption data.

4.8 Other Issues/Topics of interest

Even considering the diverse topics looked at, they do not fully cover all of the papers looked at and included in this literature review. Those that do not quite fit into one category or another, or which could be included in multiple ones, have been included in this section. Instead of simply comprising of miscellaneous works, they offer further insight into possible areas of interest and further study.

An interesting study of consumer behaviour, which looks at the effects of political partisanship on economic outlook, and spending patterns at a country and zip-code level in Michigan can be found in Mian, Nber, and Amir (2021). Data from Gallup and the University of Michigan survey of consumers is used to test whether changes in economic outlook after an election led to changes in household spending (particularly with regards to larger purchases such as automobiles, televisions et cetera). There was enough evidence to posit that consumer expectations changed based on these changes in expectations following an election. The link between falling home prices and the perception of recession was also used by looking at real estate declines at the county level, specifically before and after the real estate crash of the early 2000's in the U.S.

Less specific, but nonetheless salient is a look at the ongoing trends and concerns in household surveys as seen in Meyer et al. (2015). These trends of include increasing non-response rates, to the use of administrative and other supplementary sources of data. The under-reporting of certain types of income (namely transfer payments and benefits) is also looked at, along with biases in recall among respondents. The issue of under-coverage among the highest and lowest income population subsets is also explored (as it was in earlier sections of this literature review). Increased use of administrative data, both to determine biases in response rates, but also when linked to data from HBS, is posited as a possible solution to the increasing non-response and incorrect response (misreporting) rates in household surveys.

In Safir and Dorfman (2021), the differing uses of CE data by various United States government agencies, and the fitness of the CE data for these purposes is analysed. This is done in the context of identifying stakeholders, and data use cases for the CE data across different departments and uses, including those for which the CE data might not seem immediately relevant to (overseas posting allowance calculations for diplomats for example).

In Crossley and Winter (2014), potential sources of error in household surveys are looked at, including how to correct for them. It is well known that the survey method can affect response rates and accuracy depending on what is being asked and to whom. This might even seem to be common sense, especially when looking at self-response versus guided responses and those where responses are taken from administrative data. Similarly, recall is also a known source of potential error in surveys, with respondents being prone to misremember, include out of scope data (especially when there are discrepancies in terms of the time, period covered, such as calendar year versus the last 12 months if the question is asked mid-year for example). Expense, income and asset data may not be known offhand, and response quality may be improved if the respondent is allowed to consult their records to find this information (tax records, bank statements et cetera). Diary keeping may also present issues, when respondents are not sufficiently detailed in their responses, not followed for a sufficient time-period, or

when adherence to diary-keeping is low. In this vein, there lies the possibility that the act of diary-keeping itself alters consumer behaviour as respondents are more cognisant of their purchases when made to closely track them. In improving data collection and processing, the questions asked may also be improved, and thus result in an improved survey response rate. Seeing as this would also reduce respondent burden, it is an avenue meriting further exploration and study.

Chapter 5

Recommendations

After conducting the literature review and subsequent benchmarking exercise, there is the need to not only summarise the ideas contained in them, but also to distill these into best practices and recommendations which may then be actioned. The recommendations provided by this work have been divided into those which are specifically for Portugal, and those which apply generally to HBSs and household surveying or official statistics in general. This was done to allow for a more in-depth explanation of the situation in Portugal, and provide specific recommendations grounded in current circumstances, considering that these may be used in a future iteration of the Portuguese HBS. The general recommendations are also actionable, but do not refer to specific data sources or institutions in the way the ones for Portugal do.

5.1 General Recommendations

In this subsection, the general recommendations and best practices which can be applicable to HBSs are presented, and have been divided into the same topics as for the benchmarking review, providing some structure to what would otherwise be a rather lengthy list of not necessarily related recommendations, best practices, trends and potential issues/conflicts to be mindful of.

5.1.1 Methodologies and Data Sources

Compared to Portugal, the situation is somewhat different, but the CE can be considered an analogue of sorts to the HBS in Portugal and in other ESS countries. In Portugal as well, panel data is used for the HBS, though this is possibly to be augmented with other data sources in the future, (Parker et al., 2014).

Considering the extensive list of questions with regards to household expenditure, the use of scanner data provides a possible way to reduce the burden on participants by possibly re-filling the median amounts or by negating the need to collect some of this information directly from respondents.

With regards to income measures, these could be collected from Finanças and Segurança Social data on income, social supports, and pensions. Data on mortgages, bank charges, and interest could be provided by financial institutions instead of respondents themselves. In a similar vein, data on educational attainment from national universities, colleges, and

schools could be provided by these institutions themselves, or by the ministry of education. Healthcare expenditure information could be obtained from the SNS, private sector health providers and pharmacies.

In all these cases, either respondents would be required to consent to the collection of their information, or the HBS panel would be synthetically created using available administrative data, (INE, 2022).

In the Portuguese case, since ethnic data is not collected, native language or place of birth might be used as proxies for ethnicity, specifically for the purpose of preventing the under sampling of these minority groups (Brazilian and CPLP, British, French, Italian, Indian, Nepali, et cetera). With non-naturalised immigrants making a growing share of the population, Portugal is increasingly more multicultural, and it would be prudent for the updated HBS to include some safeguards to ensure that these minority groups are not under-sampled. The research-centric access model is of great interest, as is the cooperation and linkage of data with other ongoing studies. In the context of the HBS, this might not be straightforward in terms of implementation, privacy, and consent, but does merit further study as a future outcome to be worked towards. In particular, the creation of a website to allay respondent fears regarding their privacy, as well as to inform them of the uses of their data, and of the research conducted using it, is of great interest and fits well with the concepts of proactive disclosure and open government, (Goebel et al., 2019).

5.1.2 Data Collection

In looking at the implications for and current procedures in Portugal, there is certainly scope to compare the results of the HBS and other address or household based sampling and administrative data sources that may be more complete. Additionally, oversampling methods may be employed to account for this, (Amaya et al., 2018).

With any recall-based method, there is a degree of error involved, and potential biases towards or against certain items might change the results slightly. In transitioning to a HBS based, at least in part on administrative data sources, there might be a slight discrepancy because of the elimination of this potential source or recall error, (Sekula et al., 2005). Additionally, there might be scope to streamline the HBS to avoid duplicating data collection, (Greg & Stockburger, 2022).

In an ESS context of relatively high levels of literacy, there is still salience for such an adaption. Though it would be unwise to assume that immigrants might be illiterate, they may face barriers to accessing surveys if they are responding in a second or third language (or in some cases, may be conversational but illiterate in the local language). As surveys may or may not be translated into sufficient languages, this may be an alternative to translation (albeit as a stop-gap measure). In this study, differences were found in the expenses collected through the pictorial diary versus the traditionally collected one, (Murphy et al., 2023).

5.1.3 Administrative Data Sources

The applicability of Galli and Rosenblatt-Wisch (2022) to the Portuguese context is limited by the limitations of the study. Given the relatively high divorce rates in Portugal, lower rates of marriage and a later age at leaving home, (Eurostat, 2020), a similar study using Portuguese data would have to change the applicable criteria. Since the average age at which youth leave home is 30, it is possible that they might still receive financial or other assistance

from their parents which could impact their consumption without being reflected in the tax or property data (money, meals eaten at home et cetera). In the same way, the incidence of multi-generational living is higher than in Switzerland, as is the age at leaving home, with many adult children holding full time employment while still living in their parental home (and thus having higher levels of consumption than they might otherwise be able to afford based on their income levels), (Eurostat, 2020), (Galli & Rosenblatt-Wisch, 2022).

If these findings were to apply to Portugal, it would necessitate a deeper look at the possible under reporting of the poverty rate, and a potentially underestimated level of income inequality. As such, this is an area which merits further study and careful consideration in light of the upcoming review of the Portuguese HBS, (Blanchet et al., 2022), (Abildgren et al., 2018), (Sekula et al., 2005).

In the Portuguese case, the absence of a wealth registry in the same sense that existed in many Nordic countries is an obstacle to this, however the tax data on high-value properties might potentially be used instead, (Kolsrud et al., 2017).

A suggestion for reconciling these being the creation of an imputed HBS using both, which given Portugal's continued use of the traditional HBS method, provides a route to the gradual incorporation of administrative data in the Portuguese iteration, (Abildgren et al., 2018).

Once again, tax data is seen to be an attractive administrative data source, perhaps unsurprisingly when looking at income data, but also for other areas such as consumption which are covered by the HBS. The applicability of the 'missing rich' to the Portuguese context could help improve coverage of upper-tail incomes in the upcoming iteration of the Portuguese HBS, (Blanchet et al., 2022).

This is likely to apply to Portugal as well, especially given the potentially preferential tax treatment of certain income sources (such as the NHR, Golden Visa, Minimum wage tax exemption among others). The incomplete coverage of income by tax data can be seen when comparing it to income as measured in the National Accounts.

Given that Portugal allows for the joint filing of income taxes, this may necessitate corrections when using tax data for the upper tail of the income distribution, if joint filers are not sufficiently accounted for. The use of corporations to report income (instead of reporting it as wage income in the case of contractors) may also pose an issue in the Portuguese case, as seen in data for the United States, (Yonzan et al., 2020).

If similar methods are applied to the Portuguese context, INE would be advised to correct for potential ethnic discrepancies in coverage by using proxies for ethnicity to avoid these issues and the restriction on the collection of ethnic data. Under-reporting of retirement income in the CE data is not likely to be transposed to the Portuguese context given the differences in the pension systems of the countries, (Brummet et al., 2018).

Looking at Portugal, it would be advisable to attempt to link household income from tax data to households to help classify their income for the purposes of the HBS, particularly with regards to addressing the issue of the 'missing rich' in survey data, (Steinberg, 2020).

In terms of the Portuguese HBS, this is an attractive route forward (using the administrative data in addition to survey data) as it would be exceedingly ambitious to have the necessary infrastructure in place for a fully administrative HBS before the next iteration, (Meyer & Mittag, 2019a).

5.1.4 Record Linkage

Differences between the United States and Portugal mean that a direct comparison between the two would require further study in terms of the social programs offered and their generosity for example before being able to compare the two. What is comparable, however, is the way in which social supports are provided through different programs and agencies that may or may not be available in the same administrative dataset. The thought process can be used to link disparate datasets for different social programs in Portugal as well. Specifically in terms of the HBS, the inclusion of such data sources may provide a more complete picture of household income in cases where respondents may not consider such transfers as an income source, (Meyer & Mittag, 2019b).

When payments are made to the provider of the service instead of the recipient, these payments may not be fully reported for income purposes in surveys. As Portugal has extensive housing (rent, mortgage interest, social housing) and food subsidies, this is something to be kept in mind, and can be a benefit to using more administrative data sources to these ends. The improved data could then be used to help target said subsidies more effectively for at-risk segments of the population, (Meyer & Mittag, 2019b).

The recurring issue of survey and proxy data under-reporting incomes as compared to those obtained from registers is also discussed and deserves serious consideration in the upcoming iteration of the HBS in Portugal. The differing definitions of employment are also interesting when considering EU level statistics or making inter-country comparisons, but less so when looking solely at the Portuguese context, (Lohmann, 2011).

In the Portuguese context, the necessity to, for example obtain consent to linking of data from the HBS and administrative data is an important consideration, as well as the need to properly frame the request, and its importance to the HBS/lowering the respondent burden keeping in line with GSBPM and GDPR principles, (Struminskaya & Sakshaug, 2023).

The need to get informed consent for record linkage as seen in Sakshaug et al. (2012), can enable the use of pension data as an administrative data source, (Lüthen et al., 2021). Given the need to collect income data, including from pensioners, this might aid in reducing respondent burden in the HBS.

5.1.5 Scanner Data

It is reasonable to attempt to recreate a similar sample for Portugal as seen in Laureti and Polidoro (2022), where an SRS sample was taken of Italian supermarkets and hypermarkets, using data from Portuguese supermarkets and hypermarkets (Continente, Pingo Doce, Lidl, Aldi, Auchan et cetera). In the Portuguese case, the Household Budget Survey can aim to areas in which there might be scope for collecting additional information on a regional basis, in cases where there are likely to be significant inter-regional differences in consumption data. Given that known differences in GDP between Portuguese regions exist, (Eurostat, 2024), it might help to add a regional component, based on a calculated regional consumption basket to the HBS in an upcoming iteration. Additionally, it may be found that there is overlap in terms of the consumption basket used for CPI calculations, and coordinating within the framework of the CPI calculations, may allow for efficiencies in the revision of consumption questions accounting for regional differences in the upcoming HBS, (Laureti & Polidoro, 2022).

If the observations seen in the Canadian context seen in Luongo et al. (2022) hold in other contexts, it may be possible to simplify the collection of data on household food consumption,

at least for certain categories of more commonly consumed food staples, by using those collected from the CPI. In practice, this would require further study, both on the applicability of this procedure to another nation, and on the potential reduction in respondent burden, while maintaining the rigor of the HBS in the process of modifying the source data. Using administrative data for surveys is an established practice in Nordic countries but would require further study prior to implementation in another country.

Given the rather different culinary cultures in Canada and Portugal, it remains to be seen whether similar findings could be found when looking at overall dietary coverage, given that the Canadian study found that certain categories of foods fared worse in terms of CPI coverage than others, (Luongo et al., 2022).

Scanner data is already increasingly used as a source for the compilation of CPI indices by various NSIs. Given the overlaps between the CPI and the HBS in terms of coverage area (in terms of consumption at least), it is logical that future iterations of the HBS might also increasingly incorporate scanner data, borrowing from and adapting the methods being used in the context of the CPI to the household context.

Considering the global context of falling response rates to surveys, (Braekman et al., 2019), including official ones, (Meyer et al., 2015), working to reduce respondent burden by increasing automation in the context of the HBS could be seen as a step in reducing barriers that may be reducing response rates in the context of the HBS.

The consumption baskets from which the questions in the survey are based on might also be revised with the aid of scanner data, as it can allow for the tracking of consumption data at the household level. Taken further, it could be used to augment, or potentially replace some of the questions asked on the HBS in Portugal regarding high volume food categories (food staples such as bread, meats, fish, fruits, vegetables, et cetera) that are generally purchased through retail outlets, pending studies on the efficacy of doing so. Should such studies be favourable, such a development could greatly reduce the respondent burden for the Portuguese HBS by reducing the number of questions asked and the recall burden of estimating these expenditures. Incidentally, this is likely to increase the accuracy of the data, in providing better coverage of incidental purchases made by non-respondent household members that may not be known or directly recalled by the survey respondent.

Scanner Data is generally considered to cover retail sales data, but it is likely to compile similar data on other household expenses (utilities, housing costs, education expenses) using those collected by the providers of the relevant services. This would of course, necessitate conversations with partners in these areas, studies of the privacy implications of these, and the difficulty in ensuring adequate coverage in the case of more decentralised markets (such as the rental market, where there may be many smaller landlords who may or may not be reporting rental income). Of course, this is an area of possible further study that will not be touched on more than in passing in this work.

5.1.6 Use of Online Data

In relation to Côté et al. (2020), INE might want to preemptively address the increasing scepticism among some parts of the population regarding government functions and motives, considering reducing any potential non-response bias among this population demographic.

Though an approach of using a mobile app to collect expenditure data could supplement an existing diary survey, other alternatives should still be offered as a mobile only ap-

proach might limit participation among the less technologically literate, or those who cannot afford/chose not to use smartphones. It would be interesting to compare app collected self-scanned data and those collected through a regular diary survey, (Jäckle et al., 2019).

The results in Braekman et al. (2019) do not bode well for online only methods for the HBS but do hint that this can be used as a complementary source of data, particularly for younger respondents.

In relation to the HBS, it could potentially be used to help pre-populate spending data, or to update the household consumption basket based on future prices. Overall, it may be used to possibly reduce the burden on survey respondents and add an additional data source that may be used for the CPI as well, (Benedetti et al., 2022).

Web-scraped data as seen in Cavallo and Rigobón (2016) and da Silva et al. (2019) are already incorporated in CPI calculations as mentioned in the aforementioned works. This can be expanded on to include the HBS as well, particularly for price data, with an eye to reducing recall errors and respondent burden.

5.1.7 Covid-19

Given the topicality of Covid induced changes, the increasing availability of administrative data (of higher quality), and the resources with which to match said administrative data points to other records, it is an area in which INE could look to some of the changes implemented by the ABS in light of the upcoming methodological review of the HBS (where applicable). The use of unemployment and payroll data from the tax or social security agencies (and at a higher frequency) could be a possibility, especially as a validation of sorts for survey data, (Leigh, 2023).

The applicability of card purchase data is of great interest as it was shown to be rather accurate as a gauge of both consumer spending patterns and economic sentiment. The ability to differentiate purchases as online or offline, or local/non-local would allow for further study based on these classifications.

This is of interest not only in case of another disruptive event such as a pandemic, a war, a solar storm, cyberattack, or natural disaster, which may impede the collection of data through traditional consumer surveys. This may not seem to be the most pressing priority for Portugal, but in the event of regularly occurring natural disasters such as fire, large scale flooding, or less likely, but a more devastating event such as a volcanic eruption or a major earthquake, cash withdrawals would be limited and card payments would likely default to being the primary means of payment (assuming that communication networks continue to be functional in the affected area). It would still be prudent to include measures to ensure the timely collection, dissemination, and release of relevant statistics even in cases of adversity by exploring and studying alternative methods of data collection prior to events necessitating their use.

Returning from the world of the hypothetical, the use of transaction data could be an aid to the collection of official statistics, including the HBS process. This data could be used to supplement consumption data, or to use as a benchmark for card based consumption across categories of interest (in an anonymised and aggregate manner), (Bounie et al., 2022).

There were found to be differences in survey response rates pre and post covid. Keeping this in mind, the same may or may not be applicable to Portugal but is something worth keeping in mind for future household budget surveys, (Ash et al., 2022).

Portugal, being seismically active, and prone to fires, would seem to fall into this category,

and thus the option of supplementing the HBS should be studied in case of natural disasters. It is very likely that an evacuated region would have a different household consumption basket than an unaffected one, given such circumstances. Additionally, it would be likely that there would be additional restrictions on respondent's use of online or mobile responses due to possible network outages for example. The collection of additional information that might be relevant to the crisis would also be a positive to adopting such an approach proactively, (Kühne et al., 2020).

5.1.8 Other Issues/Topics of Interest

Though not immediately applicable to the HBS in Portugal, this could be of use when looking at consumer sentiment, and how partisan alignment might change this sentiment, without necessarily being precipitated by changes in underlying economic conditions. In the EU context, this might be applicable at the EU level (or when looking at EU wide elections) but would have to be studied further to make this conclusion Mian et al. (2021).

With regards to Portuguese response rates, further study may be required to determine the applicability of these results of the Portuguese context (increasing non-response rates to surveys) seen in Meyer et al. (2015). Given the differences in social programs between the United States and the more expansive European models, adjustments might also have to be made to account for this.

Though not necessarily of use in the Portuguese context, a data use audit of sorts for the HBS in Portugal could be a useful step towards updating the HBS data collection methods without inadvertently causing issues for data users within INE, other government agencies or researchers, (Safir & Dorfman, 2021).

5.1.9 Summary Table: General Recommendations

These recommendations have been summarised in separate recommendations tables separated by areas of focus in the tables; 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, such that they may be more easily compared and any foreseeable drawbacks have also been included.

Recommendation Type	Recommendation	Recommendation Risks
Record Linkage	The combined use of administrative and survey data. Administrative data such as tax data, educational data, and sales data in the case of countries such as Portugal where this is collected by the government offer rich sources of data that may be used to enhance the quality of the HBS and lower respondent burden, (Steinberg, 2020), (Lüthen et al., 2021), (Lohmann, 2011).	Privacy concerns, particularly regarding data linkage and public acceptance of these practices are risks, but they can likely be mitigated through proactive outreach and awareness campaigns.

Survey Response	Using pre-filled survey responses as prompts for certain expense categories can help reduce respondent burden. These categories would be the same ones which can be increasingly supplemented using administrative and scanner data (purchases, income data, social transfers et cetera). This is likely best applied for expense categories with lower variability ,(Cabral et al., 2021), (Meyer & Mittag, 2019b), .	Data collection, possible unintended nudging of responses are risks. Additionally, respondents might be unintentionally comparing their expenditures to 'average' values which are pre-filled in the forms, introducing a source of possibly biased framing. A possible workaround is the use of linked data to obtain respondent specific values where available.
Synthetic Panel Data	The use of synthetic panel data could be used to supplement or replace missing data. If the available administrative data sources are found to have sufficient coverage and completeness, it is possible to incorporate this approach as a supplement to the traditional survey with minimal disruption. In cases of incomplete or missing administrative data sources (a country not collecting certain information from residents for example), then this method can be partially applied for certain categories, as a supplement to the traditional HBS, Parker et al. (2014).	The utility of this approach is dependent on the completeness of administrative data sources.
Research-centric data access model	Encourage cooperation with end users of survey data, and input on research questions during the planning phases of the work. This could involve direct cooperation with universities and research institutions and a simplified consent mechanism for respondents modelled on the approach described in Goebel et al. (2019).	There must be proper privacy protections and transparency with regards to research cooperation, and respondents must provide consent. This could be aided through a public facing portal explaining this to respondents and researchers.

Table 5.1: General Recommendations: Methodologies and Data Sources Table

Recommendation Type	Recommendation	Recommendation Risks
Address-based sampling	Address based sampling can be employed to ensure adequate coverage of minority groups in the absence of ethnicity based data. This is of particular use in countries where the distribution of minority populations is more concentrated in specific regions (such as major cities), (Amaya et al., 2018).	The assumptions on the distribution of the population of interest must be correct, and the master sample frame should be up to date. An additional benefit of this approach is the creation of a representative sample without the need to collect ethnicity (or publish this data), since this data may be sensitive, particularly in cases where certain groups are known to face discrimination on this basis.
Streamlined HBS questionnaires	A shortened questionnaire might improve recall among respondents due to lower fatigue and the data is collected through other means. This should be done in conjunction with an increase in the use of administratively or scanner collected data (income tax data, point of sales data et cetera). A shorter survey could possibly help reduce recall error, (Greg & Stockburger, 2022).	This approach can work in the context of the use of administrative data sources and the removal of overlapping questions.
Non-national language support	Questions/interviews in native languages might improve response quality for some respondents, particularly in cases where this is known to be a barrier to response. This idea was adapted from that in Murphy et al. (2023), where a pictorial diary is used instead.	The gain in response quality should be weighed against the cost of doing so, and the risk of having a less than representative sample in not doing so.

Table 5.2: General Recommendations: Data Collection Table

Recommendation Type	Recommendation	Recommendation Risks
Data Sources	Creating an imputed HBS by using administrative and traditional data collection methods in the absence of a complete administrative dataset, (Abildgren et al., 2018).	Requires participation throughout government agencies and public acceptance.
Missing Rich	The Missing Rich issue, where wealthy respondents are not sufficiently represented in survey responses, can be partially corrected for using administrative data and data linkage, (Meyer & Mittag, 2019a), (Blanchet et al., 2022).	Privacy concerns regarding data linkage, and possible completeness issues in cases of tax evasion.
Data Sources	The use of property and wealth registry data as a data source to increase coverage of higher income individuals, (Kolsrud et al., 2017).	Not all jurisdictions have comprehensive property or wealth registries, there also exist privacy risks to this approach.
Methodology	Transition to an administrative data based HBS may require a phased approach in cases where data is not complete, or where a direct transition is not feasible, (Abildgren et al., 2018).	Reliability may vary based on the completeness of administrative data sources and there is a high likelihood that some traditional surveys will still need to be conducted.

Table 5.3: General Recommendations: Administrative Data Sources Table

Recommendation Type	Recommendation	Recommendation Risks
Regional differences	The collection of data based on regional differences can help with increased coverage of the collected spending information, as there are known differences between European regions in terms of GDP per Capita, (Laureti & Polidoro, 2022), (Eurostat, 2024).	If this is not implemented properly, it might lead to worse coverage.
Price data	Pre-filling expenditures in some sections of the HBS based on online price and transaction data, (Cavallo & Rigobón, 2016)	There may be coverage issues depending on the expense type.

Table 5.4: General Recommendations: Scanner Data Table

Recommendation Type	Recommendation	Recommendation Risks
Social Transfer Income	Administrative data sources can be used to increase coverage and completeness of data on social transfer income, including for non-cash transfers such as subsidised housing, (Meyer & Mittag, 2019b).	Data transfer agreements must be signed with the organisations implementing these transfers, which might be cumbersome.
Consent	Creating a standardised procedure for obtaining informed consent to data linkage allows for a reduction in the respondent burden, keeping in line with both GSBPM and GDPR, Struminskaya and Sakshaug (2023), Sakshaug et al. (2012).	This might decrease data linkage if the procedure and data uses are not communicated well to respondents.

Table 5.5: General Recommendations: Record Linkage Table

Recommendation Type	Recommendation	Recommendation Risks
Mobile App scanner	Using a mobile app to collect scanner data/price data directly from respondents, (Jäckle et al., 2019). This might greatly reduce the burden of the diary keeping survey, and possibly increase survey accuracy.	The efficacy of such an approach is dependent on the willingness of participants to commit to the collection method, and might prove cumbersome for a multi-week diary survey.
Trust and Openness	Running an outreach campaign to explain the value of the HBS and official statistics in general, possibly including a FAQ section or separate website helping to allay privacy concerns given that respondents are likelier to consent to data linkage after better understanding the purpose of its collection, Ng et al. (2022).	If done without proper consultation, such a program can have the opposite effect.

Table 5.6: General Recommendations: Online Data Table

Recommendation Type	Recommendation	Recommendation Risks
Transaction data	Using transaction data for collecting HBS spending information from respondents. Using either administrative data sources (such as E-Fatura in Portugal), scanner data, or card transaction data are potential sources for this. This would drastically reduce respondent burden in terms of collecting expense data, which could be mostly covered by these means (for transactions that are covered by these sources - i.e. non-cash and licit transactions), (Bounie et al., 2022), (Cavallo & Rigobón, 2016), (Bialek, 2023a), (Bialek, 2023b).	There are concerns with regards to both privacy, and completeness of the data collected in this way (they might not remember to include cash transactions not captured by card transaction data).

Table 5.7: General Recommendations: Covid-19 Table

Recommendation Type	Recommendation	Recommendation Risks
Response Rates	Combating falling response rates through survey modifications and the use of administrative data sources to reduce respondent burden. Given the importance of sufficiently high response rates to both the accuracy and even the legitimacy of official statistics, this is imperative to both the HBS and other surveys conducted by NSIs and ONAs, (Meyer et al., 2015), (Brackman et al., 2019), (Blanchet et al., 2022), (Abildgren et al., 2018) .	Privacy concerns on the part of respondents are a possible reason for falling response rates, and this can be mitigated to a degree through a public awareness campaign.
Data Sources Audit	Conducting an audit of possible data sources for the HBS both within the NSI and in the broader government and private sector, (Brummet et al., 2018), (Parker et al., 2014). This should be done in a way that improves stakeholder relations, and respects public opinions regarding the use of their data.	Requires a coordinated effort to work, and a multi-year planning horizon. Measures should be taken to avoid the appearance of privileged access to data, or of excessive data collection. Collection should be limited to that which is required, and there should be safeguards in place to ensure legal and ethical compliance as well that it be politically palatable.

Table 5.8: General Recommendations: Other Issues Table

5.2 Recommendations for Portugal

This section discusses recommendations specific to Portugal, given the context of the current situation and data environment that currently exists. These recommendations are broadly in-line with practices in other countries, and given adequate resources, organisational cooperation and public buy-in, can be seen as reasonably achievable for the next iteration of the HBS in Portugal.

In addition to these recommendations based on the current practices currently in use, this work discusses a pilot project for the next iteration of the HBS, presenting an opportunity for INE to not only implement the best practices of other NSIs, but also possibly serve as an example in terms of automation and integration of data sources. It should be noted that these recommendations have not been sorted according to the categorisations used for the second literature review, but have instead been grouped based on the time-horizon in which they can reasonably be implemented.

5.2.1 Short term

This section details the improvements/modifications that can be made to the HBS in Portugal in the short term, that is, that they can be implemented in the next round of the HBS, and do not require coordination with external bodies, extensive consultation or other processes which may delay their implementation.

Short term changes include efforts to reduce respondent burden, recall errors, and ongoing changes to the questions asked as part of the HBS. The implementation of a supplement to the upcoming HBS would be included in this section.

5.2.2 Medium term

In the scope of this work, medium term recommendations are those which require some of the conditions that short term ones do not require (that is: coordination with outside organisations, extensive consultation, or large technological/methodological changes or innovations), but can possibly be implemented in the next round of the HBS in the form of a pilot project.

5.2.3 Long Term

The long term recommendations are more in the form of objectives which can be met, yet require coordination with other government or private sector organisations, extensive public consultation or technological changes which cannot be reasonably implemented in time for the next round of the HBS, even in Pilot form.

A key recommendation for the long term is the creation of a data sharing mechanism among government entities, with a proper privacy protection framework put in place. This might involve a mechanism to allow respondents to provide or withdraw consent for their data to be shared from one government organ to another for specific purposes they are made aware of in advance. In the case of the HBS, this might be to link their pension income data to the HBS, their tax return, or medical expenses. In a similar vein, a framework should be established for data sharing for research purposes, with respondents allowed to opt-in to data sharing for research purposes, and provided with specifics on the data use, processing

and storage mechanisms should they so desire. More specifically, they should be made aware of the contributions which their contributions can make to research (not necessarily related to the HBS). The use of a website as seen in Goebel et al. (2019) would be a good start in proactively increasing public trust and cooperation.

5.2.4 Summary Table: Recommendations for Portugal

The recommendations specific to Portugal (including the data sources and potential issues), have been separated and summarised in separate summary table divided by area of focus in tables: 5.9, 5.10, 5.11, 5.12, 5.13, 5.14, 5.15. Recommendations which are not gone into further detail/include specificities in the Portuguese context, have not been repeated in this summary table to avoid repetition.

Recommendation Type	Recommendation	Recommendation Risks
Data Sources	Using Finanças data for income, providing a more complete/accurate source of income data (and including non-wage income) allows for the use of existing administrative data and possibly reducing respondent burden while increasing accuracy, as survey data can be problematic at the upper and lower tails of the income distribution and is even more useful in the context of discrepancies between survey reported income and income measured using administrative data sources, (Blanchet et al., 2022), (Brummet et al., 2018), (Korinek et al., 2005), (Lohmann, 2011), (Yonzan et al., 2020).	Privacy concerns, lack of consent from respondents, need for a data linkage agreement with Finanças.
Data Sources	Using Finanças data for purchase data (E-Fatura), given the widespread coverage of transactions and centralised collection of this transaction data (and being simpler than reaching agreements with retailers). This represents an existing source of scanner data with comprehensive coverage of transactions in Portugal, (Bounie et al., 2022).	Privacy concerns, lack of consent from respondents, need for a data linkage agreement with Finanças. Additionally, there is the need to ensure that data is depersonalised.

Data Sources	Using Finanças data for rental contracts and property tax information. Finanças has a record of all the legal rental contracts (this being a legal requirement), with the parties to the contract, rental amounts, increases, terms and conditions et cetera being available in this data. Property tax information is also available for residential properties (of interest to the HBS). This data can be used to reduce respondent burden with regards to reporting rental and property tax expenses (as well as rental income), while potentially increasing the accuracy of said data collection, (Bounie et al., 2022), (Galli & Rosenblatt-Wisch, 2022), (Kolsrud et al., 2017).	Privacy concerns, lack of consent from respondents, need for a data linkage agreement with Finanças. Additionally, there is the need to ensure that data is de-personalised.
Data Sources	Using Segurança social data for pension and social transfer income data. If this is done using informed consent, it can reduce respondent burden, increase HBS accuracy, and reduce the duplication of data collection by different branches of government, (Lüthen et al., 2021).	Privacy concerns, the lack of a data linkage consent mechanism, lack of a framework for accessing SS data are potential issues to this approach. As with other cooperation proposals, this would require significant inter-departmental cooperation at a high level and public buy in to be successful.
Data Sources	Using IEFP data as a source of information on social transfers and employment training. The IEFP data, particularly with regards to training can help increase the coverage of the HBS in cases where unemployed respondents do not report the IEFP related courses and training as education in the same way they might report a post-secondary or technical program (potentially inflating the number of NEETs reported). This could possibly be used by IEFP to better tailor their training programs based on anonymised demographic data which could be provided from the HBS by INE. INE would be able to reduce respondent burden and possibly collection costs, (Meyer & Mittag, 2019b).	Privacy concerns, the lack of a data linkage consent mechanism, lack of a framework for accessing IEFP data, particularly for something which can be perceived as having social stigma (receiving social transfer payments).

Data Sources	Using SNS Data as a source of healthcare expenditures (and for health data), which can be done by receiving informed consent from recipients and implementing strict data handling and processing protocols. This data could potentially be used for cohort studies and other health and social policy research in addition to the HBS as was seen in Kühne et al. (2020).	Privacy concerns, the lack of a data linkage consent mechanism, lack of a framework for accessing SNS data. There is the additional risk related to accessing medical data.
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Table 5.9: Recommendations for Portugal: Methodology Table

Recommendation Type	Recommendation	Recommendation Risks
Address-based oversampling	Using address based oversampling to better capture minority populations which may have barriers to filling out the HBS (language or otherwise) in the context of the use of administrative data can reduce under-sampling for these groups that might otherwise occur. Given the lack of data collection on ethnic minority status, oversampling urban areas known to have significant minority populations is a way around this, (Amaya et al., 2018).	Privacy concerns, particularly with regards to groups that have historically faced discrimination in Portugal should be taken into account, and addressed before implementing such a system.
Non-Portuguese Language supports	Reinforcing and publicising the availability of native language response options for the HBS can help improve response rates. This approach is already used by AIMA for example, and could be useful for first generation immigrants who may be comfortable with everyday Portuguese but may require assistance for more formal purposes. In such cases, this could also possibly lead to increases in response accuracy. This approach derives from the differential response accuracy seen in Murphy et al. (2023).	This would require extensive preparation and may not be feasible for the upcoming HBS iteration if the program is expanded to more than a few extra languages. It would be best to proceed with caution to ensure there is sufficient capacity, and that it is matched to areas where the need is greatest.

Table 5.10: Recommendations for Portugal: Data Collection

Recommendation Type	Recommendation	Recommendation Risks
Pilot Project	Creating a supplement to the HBS incorporating the use of administrative data sources, and is discussed in depth in section. The idea of using a supplement to the existing survey comes from (Kühne et al., 2020).	This would require extensive preparation and may not be feasible for the upcoming HBS iteration.

Table 5.11: Recommendations for Portugal: Administrative Data Sources

Recommendation Type	Recommendation	Recommendation Risks
Collecting receipts	These are to be collected from diary survey respondents of the HBS, to be scanned with OCR and then processed by the data team at INE, increasing accuracy and reducing respondent burden , (Jäckle et al., 2019).	Receipts may not be obtained or kept for all purchases, and this approach would require significant planning ahead of implementation.

Table 5.12: Recommendations for Portugal: Scanner Data

Recommendation Type	Recommendation	Recommendation Risks
Consent	Creating a standardised consent mechanism to allow for personal data transfers to and from INE and other government departments, in a manner that is consistent with GSBPM and GDPR related obligation, (Sakshaug et al., 2012), (Struminskaya & Sakshaug, 2023).	This would require cooperation throughout the government (or at least two major government departments to start), and will likely require ministerial and public approval.

Table 5.13: Recommendations for Portugal: Record Linkage

Recommendation Type	Recommendation	Recommendation Risks
Disaster Preparedness	Creating contingency plans for the continuation of surveys or the implementation of ad hoc ones in case of a natural disaster in Portugal (Fire, Earthquake, Flooding, Volcanic eruption et cetera).	Preparedness for adverse events helps reduce risks when they do occur (given the geological context, many of these are unavoidable risks), (Kühne et al., 2020).
Disaster Preparedness	Substituting Transaction data in lieu of Survey data in the absence of survey data due to a disaster could allow for the continuation of statistical data collection without imposing on those affected. The use of card data as during the pandemic as seen in Bounie et al. (2022) is a possible method of doing this, assuming that the payments systems are still functional in the affected area.	If sufficient care is taken for data anonymisation and adequate consent obtained, this approach is preferable to surveying evacuees.

Table 5.14: Recommendations for Portugal: Covid-19 Table

Recommendation Type	Recommendation	Recommendation Risks
Data Sources Audit	Evaluate potential data sources for the HBS within INE and coordinate with other government departments at the national and local level on data sharing for the HBS and other purposes such as seen in Safir and Dorfman (2021).	This would require government-wide cooperation, including possibly from local health authorities and municipal governments, and not be feasible within a short time frame
Public Outreach	Creating a public facing portal to explain data collection processes related to the HBS (and possibly the census) with the aim of allaying public fears related to data collection and processing before they arise. This should use simplified everyday language to explain data processing safeguards and consent mechanisms for example, such that non-technical individuals can understand how their personal information is used, processed, and how it benefits them (the public benefits created by having up to date HBS data in this case), (Goebel et al., 2019), .	This would require cooperation through INE, to create a more user friendly portal for this purpose. If not done properly, and with proper public input, this could fail to properly allay privacy concerns. Additionally, it is imperative that privacy protections such as anonymisation techniques be properly explained in lay terms.
Data Sharing for research	Creating a simplified system for research partnerships using HBS data (with informed consent), for example in partnership with Portuguese universities could help avoid duplication in data collection, and help the public better understand the public interest in providing accurate data. This would be further aided if there was a additional public facing portal showcasing research projects using survey data, and the benefits of said research, creating a sense of agency when coupled with specific research project linked consent mechanisms. This approach is based on that of Goebel et al. (2019).	This would require extensive cooperation between INE and higher education institutions, as well as research organisations in Portugal, and might be a lengthy process if launched to cover all of them at once. It would be wise to focus on specific partnerships with a single institution and scale the partnership, using the experience to refine the user experience for participants, researchers, and INE based collaborators.

Table 5.15: Recommendations for Portugal: Other Issues Table

5.2.5 Pilot Plan

Aside from the short term recommendations which have been fleshed out in detail, this work details a Medium term project for the next HBS, which could be implemented as a pilot project. Due to the limitations inherent in this work, and the 5-year intervals between rounds of the HBS, this plan has been limited to a theoretical implementation plan, based on both statistical and software development principles. Project areas of focus have been selected based on their feasibility (not all of the medium term recommendations have been included in this project plan), impact, and the risks involved.

The pilot plan involves creating a framework for the roll-out of a administrative and other alternative data source based supplement in time for the upcoming revision to the HBS. This would involve increasing the sample size for the HBS, and using an SRS to select a subset of respondents to complete the revamped HBS or HBS supplement. The supplement itself would include the collection receipts from respondents, to be scanned. Asking for receipts and scanning them instead of relying on recall would greatly reduce respondent burden, provided that they are made aware of the need to provide receipts for the coverage period. These receipts can be coded and categorised by INE, reducing the risk of mis-classification of expenditures due to respondent error.

This could possibly be trialed with a small test set during an upcoming iteration of the HBS, to confirm that the data accuracy is in-line with that expected of the HBS in Portugal. As with any IT project, this should involve consultation with all involved stakeholders, including respondents, INE staff, and data users, as well as the development team (or Data Analysts/Scientists) who will be developing the data pipeline for this work.

It will be necessary to include a large enough sample to prevent the developed classification models from being over-fitted, but will be limited by cost, time and other resource constraints. Similarly, for a pilot project, it would make sense to allow for the modification of the collection methods as issues arise, similar to what might happen in a software development project.

Ideally, the classification model should be able to automatically classify expenses from receipts, but this is unlikely to be the case for every case, and the use of human SMEs from INE to correct these errors when they arise should assist with this greatly.

For purchases where receipts are not provided, or kept, regular recall methods should be used, however, the use of recall data should be kept to a minimum in order to better understand the differences in data quality between the recall and scanned receipt data.

An additional dimension to this and potentially using the same sample of respondents who were asked to scan their receipts (or a different one from the population of HBS respondents), would be to link respondents to administrative data sources. This would involve asking for consent to link to administrative data sources.

To bring this to fruition, the framework for cooperation has to be established with these organisations before the pilot can begin. This not only ensures that data transfer mechanism is in place for the pilot, but also that the utility of the data source is verified prior to use. Respondents should be provided an incentive to data linkage and should be made aware of the data processing and protection procedures. In terms of the benefits to the respondent, these would primarily be related to reduced response times for the HBS, as linked data can be easily obtained from the external sources (income, pensions, unemployment benefits, health spending et cetera).

To improve data collection in the HBS a strategic approach would be to integrate available

administrative data, such as those from the e-fatura system. This system allows for the automatic collection of information on various expenses, like utilities, healthcare, and education, reducing the burden on respondents. However, the use of e-fatura has some limitations, particularly regarding housing expenses, as it only captures rents paid to companies, excluding most rents from private landlords. To address this gap, it is essential to complement e-fatura data with information from the RER (Electronic Rent Receipts), ensuring more comprehensive coverage of housing expenses. Additionally, to accurately capture daily expenses, such as food, it is crucial to use the IECOM. IECOM is an annual sample survey aimed at companies in Portugal whose main activity is commerce. It is especially aimed at gaining detailed knowledge of the sales structure of companies according to their products. IECOM provides the share of expenses by product category as reported by companies. Applying these specific weights to e-fatura data would yield a more detailed and representative estimate of household spending. It's also important to consider the representativeness of e-fatura, which is strong among individuals aged 30 to 74 and in households with minors. In households without minors, representativeness tends to be lower, requiring methodological adjustments or supplementation with other data sources to ensure accurate results. This integration of administrative sources not only optimizes the data collection process but also enhances the quality and reliability of the collected data, providing a more accurate picture of household budgets.

In terms of the data linkage in Portugal, it could be done on the basis of Fiscal numbers (NIF), such as explained above when discussing the e-fatura, or alternatively based on Social Security numbers (NISS) for other purposes. The use of addresses for linkage is also a possibility, but would be limited by the completeness of the Ficha Nacional das Alojamentos. The first two present privacy concerns, and would need to be accompanied by increased outreach to negate concerns relating to privacy. There is also the issue of getting the relevant organisations (Financas and Seguranca Social) to buy into the program, and establish a mechanism for the verification of data sharing consent and for the actual transfer of data from the relevant organisations.

In the case of using address based linkage, it would present fewer privacy concerns, and not be individually identifiable in the case of households, but would be limited to the most recent version of the FNA, posing problems in terms of the coverage of the linked datasets. Additionally, it is important to include a mechanism to withdraw consent, such that respondents may feel more at ease with the process, and it be in line with GDPR.

Another component of the pilot program would be to partner with research institutions (such as universities), to build a framework for data sharing, with adequate data protections and consent obtained from HBS respondents. This might include involving researchers in the design of supplementary questions for the HBS, and ensuring that the data is properly protected and treated in accordance to the permissions obtained from respondents.

5.3 Related areas of study

Though this work focuses on the potential improvements to the HBS process in Portugal, further areas of improvement not directly related to the HBS also exist, and have been discussed briefly in this section. As they are not directly related to the Portuguese HBS or the suggested Pilot project for its upcoming iteration, they have not been discussed in the earlier part of the recommendations section.

The HBS data can be used to supplement research in other areas, as it provides a good starting point for data linkage, as well as a treasure trove of consumption data in panel form (which is not necessarily the case for regular scanner data). It also contains income data, providing a much more in-depth picture of the households covered than most other surveys.

Chapter 6

Conclusion

6.1 Final Remarks

Though this work may have experienced setbacks along the way, it was finally completed, leading to the current iteration. Originally, a work was conducted on a different, if related topic, but due to certain personal circumstances, the work was restarted with a different topic, that is the current one, after a gap of sorts. Overall, the work provides an overview of the current state of the HBS and surveys in both Portugal and the ESS in general, as well as providing some actionable recommendations for INE with regards to the upcoming methodological review of the HBS. It sook to meet the objective of:

- 1) Determining the current state of the HBS in Portugal and Other Jurisdictions.
- 2) Providing recommendations for improvements to the HBS methodology in general and in a more targeted manner for Portugal.

These objective were met, and this was done through the form of two reviews; a systematic literature review, and a non-systematic benchmarking based review. The first literature review focused on the first objective, and the following research questions:

- 1) What is the current state of HBS's and official surveying in general
- 2) Are there any trends or relevant innovations in this area?

In relation to the first and second research questions, the work finds that the HBS and surveying in general are areas in flux, with new data sources (online, scanner, administrative), new challenges (non-response, privacy concerns, data linkage), and events such as the Covid-19 pandemic necessitating a variety of innovations in response to these.

In addition to this, the benchmarking based, broader review focused on these questions instead:

- 1) What are the best practices in other countries?
- 2) What are potential improvements to the HBS?

3) What are potential sources of error in the HBS?

The best practices in other countries, did not necessarily relate only to the HBS, but included survey innovations that could also be reasonably applied to the HBS as well. In terms of improvements, increased use of additional data sources (administrative, online, scanner et cetera), data linkage, and modified survey methods (online, app-based, pre-filled responses et cetera) were suggested among others. In terms of the sources of error, they are similar to those for other areas of surveying, that is, proxy-related, non-response bias (including based on income levels or minority status), and misreporting (unintentional when relating to recall errors, potentially intentional in terms of income discrepancies when compared to tax data).

Following this, the work produced recommendations for the HBS, and for the Portuguese one in particular, recommending a mix of innovations, and methodological adjustments, in line with the existing conditions in Portugal and what was deemed realistic within said socio-legal context. A key recommendation was the creation of a pilot project to implement both scanner based data collection, and incorporate the use of administrative data sources through consensual record linkage for a subset of respondents in the upcoming iteration of the HBS.

6.2 Limitations and Future Work

The recommendations made in this work, regarding the HBS in Portugal, could be studied further in terms of their feasibility, and then applied in an upcoming iteration of the HBS. The multi-disciplinary approach taken in the benchmarking review in the work helps to cast a wide net in terms of the methods, approaches, and recommendations. In essence, this work provides a starting point from which new methods may be implemented in the Portuguese HBS, highlighting further areas of study.

With regards to the pilot plan, and the suggested data sources which might be explored in future, there is scope for continued study, particularly in coordination with other governmental organisations and ONAs in Portugal. This is a promising area of study, particularly with regards to the data sharing and consent mechanisms and merits further exploration.

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