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Potential Economic Consequences of Migration Arising From Different Consumption Structures of Nationals and Immigrants: An Input-Output Approach

Potenciais Consequências Económicas das Migrações Decorrentes dos Diferentes Padrões de Consumo de Nacionais e Imigrantes: Uma Abordagem *Input-Output*

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Abstract/ Resumo

The main purpose of this paper is to contribute for a better understanding of the potential economic consequences of migration that may arise from different consumption structures. To address this question, in a first step, the different consumption patterns of nationals and foreigners are measured, using data from a Family Income and Expenditure Survey in Portugal (Inquérito às Despesas das Famílias, 2010/2011).

O principal objetivo deste artigo é contribuir para uma melhor compreensão das potenciais consequências económicas das migrações associadas às diferentes estruturas de consumo. Para avaliar esta questão, em primeiro lugar, são obtidas as estruturas de consumo de nacionais e estrangeiros, usando os dados do Inquérito às Despesas das Famílias (*IDEF*) 2010/2011. As famílias são classificadas de acordo com a proporção

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Households are grouped according to the proportion of foreigners and the consumption structures of these groups are determined and compared. This information is useful in assessing the differences in living conditions across national and migrant families. In a second step, the sectoral and macroeconomic impacts (in gross output, value added, GDP, imports and employment) of these different consumption structures are simulated, using an Input-Output approach, and they are also regionalized. These results allow us to project more accurately the potential demand led effects of a growing immigration flow to Portugal (both of workers and retirees) expected for the coming years by using foreign specific consumption structures.

Keywords: migration; consumption structures; Input-Output model; regionalization

JEL codes: C67, D57, E20, R23

de estrangeiros e as estruturas de consumo de cada tipo de família são determinadas e comparadas. Esta informação é relevante na averiguação da existência de diferentes condições de vida entre famílias de nacionais e famílias de imigrantes. Em segundo lugar, num enquadramento *Input-Output*, são simulados os impactos macroeconómicos e sectoriais (produção, valor acrescentado, PIB, importações e emprego) das diferentes estruturas de consumo, sendo posteriormente regionalizados. Estes resultados permitem projetar com maior precisão os efeitos potenciais do lado da procura resultantes do aumento do fluxo de imigração (trabalhadores e reformados) esperados para os próximos anos usando estruturas de consumo específicas das famílias estrangeiras.

Palavras-chave: migrações; estruturas de consumo; modelo *Input-Output*; regionalização

Códigos JEL: C67, D57, E20, R23

1. INTRODUCTION

In the recent years, the analysis of migrations has attracted growing interest, especially due to the increase of migration flows towards developed countries. Even in Portugal, which is not a primary destination for these flows, between 2008 and 2018, the number of permanent immigrants has grown 45% and the weight of foreign residents in total residents increased to 4.8% in 2018.

Economic analysis has focused on the study of the impact of migrations on economic growth and labour productivity (Felbermayr *et al.*, 2010; Boubtane *et al.*, 2016) and its effects on the labour market (Borjas, 2003; Islam and Kahn, 2015), trade (Artal-Tur *et al.*, 2014), remittances (Akkoyunlu and Siliverstovs, 2014) and public finances (Rowthorn, 2008; Dustmann and Frattini, 2014).

Other potential dimensions of the impact of migration on the host economy, for example due to changes in the structure of GDP or of GDP growth, have not been the object of analysis, particularly using the Input-Output framework. Along this line, we only find the study of Arce and Mahia (2013) that estimates the direct and indirect effects of migration on Madrid Region GDP. At the regional level, there is the reference paper of Sastry (1992) that estimates the impacts of elderly immigration on output, earnings and employment and using a regional Input-Output model quantifies total impacts for Florida.

In the short run, there are two main economic effects resulting from the entry of immigrants. The first one is a production or supply side effect, associated to the value added generated by migrant employees and the value added derived from the economic sectors where they are employed. The second one is a demand side effect, resulting from the value added generated by the consumption expenditures of foreign households. In this paper, we use the Leontief Input-Output model to assess to what extent this second effect is relevant, by considering foreign specific consumption structures.

Greenwood and McDowell (1999) points the role of immigrants as consumers that affects positively the aggregate demand. From a theoretical point of view, immigrants contribute to the expansion of the size of the domestic market, rise demand for goods and services allowing for economic and aggregate *per capita* income growth.

This work has two main purposes, both applied to the Portuguese case. The first purpose is to investigate whether foreign families, families whose members are all-Portuguese and mixed households (which contain at least one foreign element and one national element)

exhibit distinct consumption structures. The second purpose is to study the macroeconomic impacts on GDP, imports and employment resulting from the existence of different consumption structures associated with the types of families mentioned, by quantifying and comparing their effects.

The relevance of this study relies in two fundamental contributions. The first is the characterization and comparison of consumption patterns associated with the types of families under analysis. The second is the simulation of the macroeconomic effects, including its regionalization, resulting from a different composition of the Portuguese population arising from the entry of immigrants into Portugal.

The methodology used is based on the Leontief Input-Output Model and consists in the quantification of the different direct and indirect effects on the gross output, gross value added, GDP, imports and employment generated from an equivalent variation in private consumption of the different types of families, normalized at 100€. *NUTS II* regional impacts on gross value added and employment are also computed.[1]

The Leontief model is based on the assumption that the inter-sectoral relations are unchanged in the short run and therefore it is a useful tool for estimating the current effect on private consumption derived by the different consumption structure of the immigrants compared to the non-foreign residents. As a simplifying hypothesis, we will assume that the structure of consumption of potential immigrants is the same as the foreigners who already live in Portugal.

The remainder of this paper is organized as follows. In the Section 2, we present the data regarding the regional distribution, average incomes, expenditures, and saving rates, distribution of income by deciles and consumption structures of families with all Portuguese elements and families with all foreign elements. Section 3 describes the methodology used for determining macroeconomic impacts and its regionalization resulting from the existence of different consumption structures of two types of families. Section 4 presents the results obtained. Finally, Section 5 concludes.

2. DATA

In order to identify potential differences in patterns of consumption by type of family, we define six types of families, according to the criteria of nationality, namely: i) families with all Portuguese elements, ii) families with all foreign elements, iii) families with a majority of foreign elements, iv) families with at least a foreign element, v) families with both foreign couple heads, and vi) families with at least one foreign couple head. The two first types of families are considered as pure families while the other types of families are considered as mixed families.

Table 1 presents the distribution of families by type considering the data from *Inquérito às Despesas das Famílias* (*IDEF*) 2010/2011, whose sample covers 9,489 families and 24,383 individuals.[2]

Table 1: Number of families by type (survey and total population)

Types of families	Nº of families (survey)	Nº of families (total population)
Families with all Portuguese elements	9,054	3,812,201
Families with all foreign elements	162	85,956
Families with a majority of foreign elements	290	168,375
Families with at least a foreign element	435	231,899
Families with both foreign couple heads	110	58,454
Families with at least one foreign couple head	357	198,393
Total of families	9,489	4,044,100

Source: Authors´ calculations based on data from *IDEF 2010/2011*.

[1] *NUTS*: Nomenclatura das Unidades Territoriais para Fins Estatísticos. These are regional divisions in all member states of European Union and they are used for construction of regional statistics by Eurostat. In Portugal, *NUTS II* are: Norte, Centro, Lisboa, Alentejo, Algarve, R. A. Açores and R.A. Madeira.

[2] *IDEF* is a household expenditure survey published by the Portuguese Statistical Institute (*INE*) every five years and it is aims to collect statistical data on the volume and structure of expenditure and income amounts of household resident in Portugal.

Table 1 shows that in the survey there are 9,054 families only composed by individuals with Portuguese nationality and 162 only composed by foreigners, in a total of 9,216 pure families. Furthermore, we can conclude that there are 273 mixed families, which contains Portuguese and foreign elements. When we consider the total population, there are 3,812,201 families with all Portuguese elements, 85,956 with all foreign elements and 145,943 mixed families.

Table 2 shows the regional distribution by *NUTS II* of the families with all Portuguese elements and families with all foreign elements. The two types of pure families have a different regional distribution. The Portuguese-only families are relatively well distributed across regions whereas foreign-only families are predominantly concentrated in the regions of Lisboa and Algarve and with little presence in the regions of R. A. Açores and R. A. Madeira.

Table 2: Regional distribution by *NUTS II* by types of pure families

NUTS II	Families with all Portuguese elements (%)	Families with all foreign elements (%)
Norte	21.2	6.8
Centro	16.1	6.8
Lisboa	14.9	26.5
Alentejo	14.8	7.4
Algarve	13.4	48.8
R.A. Açores	8.6	0.0
R.A. Madeira	11.0	3.7

Source: Authors´ calculations

With data from *IDEF 2010/2011*, we calculate for each type of family the average income (total and monetary), the average expenditure (total and monetary) and the average saving rate (total and monetary). Table 3 presents these values.

Table 3: Average Incomes, Expenditures and Saving Rates for pure families

	Families with all Portuguese elements	Families with all foreign elements
Average Total Income (€)	13,876.17	11,425.24
Average Monetary Income (€)	11,007.87	9,940.88
Average Total Expenditure (€)	11,888.70	10,173.52
Average Monetary Expenditure (€)	9,020.40	8,689.16
Average Total Saving Rate (%)	14.3	11.0
Average Monetary Saving Rate (%)	18.1	12.6

Source: Authors´ calculations.

Table 3 shows that families with all Portuguese elements have average income (total and monetary), average expenditure (total and monetary) and average saving rate (total and monetary) higher than families with all foreign elements.

Table 4 presents the distribution of income of types of pure families by deciles (equivalised total income). It shows that the all-Portuguese families have a more equitable distribution of income, whereas families with all foreign elements are more concentrated in the lower income deciles.

Table 4: Distribution of income of types of pure families by deciles

Income Deciles	Families with all Portuguese elements (%)	Families with all foreign elements (%)
Decile 1	9.8	14.8
Decile 2	11.2	13.0
Decile 3	11.1	10.5
Decile 4	10.9	8.6
Decile 5	10.4	15.4
Decile 6	10.4	8.6
Decile 7	10.2	7.4
Decile 8	9.1	6.8
Decile 9	9.2	6.2
Decile 10	7.8	8.6

Source: Authors' calculations.

To compute the consumption structures of the different types of families defined, we use data from *IDEF 2010/2011*. This survey classifies consumption expenditure on household goods and services into twelve categories, according to the *COICOP* (Classification of Individual Consumption by Purpose). The categories of consumption are: food and non-alcoholic beverages; alcoholic beverages, tobacco and narcotics; clothing and footwear; housing, water, electricity, gas and other fuels; furnishings, household equipment and routine household maintenance; health; transport; communication; recreation and culture; education; restaurants and hotels; and other goods and services.

Table 5 shows the weight of expenditure in each expenditure category in relation to total expenditure (the consumption structures) and the differences between those weights for each category between the two types of pure families.

Analysing Table 5, we can conclude that the two types of families have a different consumption behaviour. More specifically, we find that: i) all-foreign families expends more in restaurants and hotels; housing, water, electricity, gas and other fuels; transport; alcoholic beverages, tobacco and narcotics; and communication compared to all-Portuguese families; and ii) all-Portuguese families expend more in health; food and non-alcoholic beverages; education and others goods and services compared to all-foreign families. Additionally, there are no differences between the two types of families in the consumption of clothing and footwear; furnishings, household equipment and routine household maintenance; and recreation and culture.

Table 5: Consumption structures by types of pure families and differences

Categories of expenditures	Families with all Portuguese elements (%)	Families with all foreign elements (%)	Differences foreigners / Portuguese (p.p.)
Food and non-alcoholic beverages	14	12	– 2
Alcoholic beverages, tobacco and narcotics	2	3	1
Clothing and footwear	3	3	0
Housing, water, electricity, gas and other fuels	31	33	2
Furnishings, household equipment and routine household maintenance	4	4	0
Health	6	3	– 3
Transport	14	16	2
Communication	3	4	1
Recreation and culture	5	5	0
Education	2	1	– 1
Restaurants and hotels	9	12	3
Other goods and services	6	5	– 1
Total	100	100	

Source: Authors´ calculations.

After having computed the consumption structures, a bridge matrix (provided by *INE*) was used to match the consumption expenditure classified by *COICOP* nomenclature with the private consumption directed to each of the 64 sectors of the Input-Output (IO) table. The IO tables use a classification of good and services different from the *COICOP* nomenclature, namely the Classification of Products by Activity (CPA). This exercise allows us to determine the vertical (sectoral) consumption for each type of family, used to build six columns of private consumption.

The IO table used is based in the *Matriz de Produção Nacional* (Domestic Flows Table) of 2013, with 64 products/sectors, provided by *INE* and calibrated and adjusted for that year. Employment data referring to 38 sectors and was also provided by *INE*.

3. METHODOLOGY

For the determination of macroeconomic impacts from a variation in the consumption of the different types of families, we use the Leontief Input-Output Model (see Miller and Blair, 2009, and Amaral and Lopes, 2018). This methodology allows us to quantify the direct and indirect effects on gross output (*GO*), gross value added (*GVA*), *GDP*, imports (*Im*) and employment (*E*) resulting from a variation in (total) private consumption (*C*) of the different types of families.

If an economy is modelled according to the Leontief model, the basic equation is:

$$x=Ax+y \qquad (1)$$

where **x** is the column vector of gross output values of the *n* sectors of the economy; **y** is the final demand vector; and **A** is the (domestic) technical coefficients matrix.

The solution of this system is:

$$x´=(I–A)^{-1}y, \quad (2)$$

where $(I – A)^{-1}$ is the inverse matrix of output multipliers, that can be represented by B, whose generic element, b_{ij}, gives the increase of sector´s *i* production caused by an additional unitary final demand directed to sector *j*.

We define that:

ΔGO_k is the variation of column vector of gross output values of the *n* sectors of the economy resulting from variation of private consumption of family of type *k*;

a^{Ck} is the vertical coefficient of consumption directed to the productive sectors of family of type *k*;

a^v is the (line) vector of value added coefficients of *n* sectors ($a^v_j = GVA_j / GO_j$);

a^l is the (line) vector of employment coefficients of n sectors ($a^l_j = E_j / GO_j$);

i' is a line vector of 1's;

a^t_{Ck} is the vertical coefficient of net indirect taxes on private consumption of family of type k;

ΔC_k is the variation of private consumption of family of type k;

ΔGVA_k is the variation of gross value added resulting from a variation of private consumption of family of type k;

ΔGDP_k is the variation of GDP resulting from a variation of private consumption of family type k;

ΔTiZ_k is the variation of net indirect taxes on private consumption of family of type k;

ΔImp_k is the variation of imports resulting from variation of private consumption of family of type k

Therefore, we can write:

$$\Delta GO_k = \Delta x = B \Delta y = B a^{Ck} \Delta C_k \quad (3)$$

$$\Delta GO_k = i' B a^{Ck} \Delta C_k \quad (4)$$

$$\Delta GVA_k = a^v \Delta GO_k = a^v B a^{Ck} \Delta C_k \quad (5)$$

$$\Delta GDP_k = \Delta GVA_k + \Delta TiZ_k \quad (6)$$

$$\Delta TiZ_k = a^t_{Ck} \Delta C_k \quad (7)$$

Using the previous expression, (6) can be rewritten as:

$$\Delta GDP_k = \Delta GVA_k + \Delta TiZ_k = a^v \, B \, a^{Ck} \, \Delta C_k + a^t_{Ck} \, \Delta C_k = [a^v \, B \, a^{Ck} + a^t_{Ck}] \, \Delta C_k \quad (8)$$

Additionally, we have:

$$\Delta Imp_k = \Delta C_k - \Delta GDP_k = \Delta C_k - [a^v \, B \, a^{Ck} + a^t_{Ck}] \, \Delta C_k = [1 - a^v \, B \, a^{Ck} - a^t_{Ck}] \, \Delta C_k \quad (9)$$

$$\Delta E_k = a^l \, \Delta GO_k = a^l \, B \, \Delta y = a^l \, B \, a^{Ck} \, \Delta C_k \quad (10)$$

Additionally, and in order to regionalize the macroeconomic impacts on GVA and employment, we use location quotients for these macroeconomic variables based in the weight for each sector of regional GVA or employment on national GVA or employment. Therefore, we define that:

$$\Delta GVA_{k,s,r} = \Delta GVA_{k,s} * GVA_{s,r} / GVA_s, \quad (11)$$

with:

$\Delta GVA_{k,s,r}$: variation of GVA of sector s in the region r resulting from the variation of consumption of families of type k

$\Delta GVA_{k,s}$: variation of GVA of sector s resulting from the variation of consumption of families of type k

$GVA_{s,r}$: GVA of sector s in the region r

GVA_s: GVA of sector s

and

$$\Delta E_{k,s,r} = \Delta E_{k,s} * E_{s,r} / E_s, \quad (12)$$

with:

$\Delta E_{k,s,r}$: variation of employment of sector s in the region r resulting from the variation of consumption of families of type k

$\Delta E_{k,s}$: variation of employment of sector s resulting from the variation of consumption of families of type k

$E_{s,r}$: employment of sector s in the region r

E_s: employment of sector s

For each sector s, we have: $\sum_{r=1}^{R} VAB_{s,r} / VAB_s = 1$ and $\sum_{r=1}^{R} E_{s,r} / E_s = 1$.

Finally, for all families of type k and region r, we can calculate: $\Delta VAB_{k,r} = \sum_{s=1}^{S} \Delta VAB_{k,s,r}$ and $\Delta E_{k,r} = \sum_{s=1}^{S} \Delta E_{k,s,r}$.

4. RESULTS

The simulated impacts on gross output (GO), gross value added (GVA), GDP, imports (Imp) resulting from the variation of 100€ of the consumption of each type of family are shown in Table 6. Due to a scale effect, the impacts on employment (E) results presented in Table 6 are computed for a variation of one million euros of consumption of each type of family.

Table 6: Simulation of the macroeconomic impacts

Types of families	Δ*GO*	Δ*GVA*	Δ*GDP*	Δ*Imp*	Δ*E*
Families with all Portuguese elements	115.438	64.599	78.555	21.445	15.371
Families with all foreign elements	116.359	65.747	78.937	21.063	14.477

Note: Employment is expressed as number of workers.
Source: Authors´ calculations.

The key findings of our study are as follows. The variation in private consumption of all-foreign families results in a greater variation of *GVA* and *GDP* and a smaller variation of imports and employment. Our results also suggest that the greater the proportion of foreigners in a household, the greater the variation of *GVA* and *GDP* and the smaller the variation of imports and employment that is generated by the same variation of private consumption. These results means that foreigners tend to consume relatively more goods and services produced/supplied by sectors with higher value added and lower imported and labour content, relative to nationals, which points to a positive demand led macroeconomic effect of a larger proportion of immigrants in Portugal, for the same size of population.

Tables 7 and 8 show the regional distribution by *NUTS II* by type of pure families of the variation of *GVA* and employment, respectively. Analysing these tables, we can conclude, for both types of families, that the higher regional impacts on gross value added and employment are in Lisboa and Norte and the lower regional impacts are in R. A. Açores and R. A. Madeira.

Table 7: Regional distribution by *NUTS II* by types of pure families of the variation of *GVA*

NUTS II	Families with all Portuguese elements	Families with all foreign elements
Norte	16.779	16.637
Centro	9.877	9.756
Lisboa	29.950	31.476
Alentejo	3.801	3.750
Algarve	1.896	1.869
R.A. Açores	0.996	0.988
R.A. Madeira	1.282	1.261
National	64.599	65.747

Source: Authors´ calculations.

Table 8: Regional distribution by *NUTS II* by types of pure families of the variation of employment

NUTS II	Families with all Portuguese elements	Families with all foreign elements
Norte	4.356	4.032
Centro	2.787	2.593
Lisboa	5.878	5.664
Alentejo	1.105	1.040
Algarve	0.565	0.520
R.A. Açores	0.302	0.281
R.A. Madeira	0.371	0.341
National	15.371	14.477

Source: Authors´ calculations.

5. CONCLUSIONS

In line with our expectations, the proportion of each different item in the consumption basket of all-Portuguese and all-foreign families, that is, their consumption structures, are different. All foreign families tend to spend relatively more in hotels; housing, water, electricity, gas and other fuels; and transport; and relatively less in food and non-alcoholic beverages and health.

All-foreign families are more concentrated in Lisboa and Algarve and less prevalent in R A. Açores and R. A. Madeira. They are also more concentrated in the first deciles of income distribution. Additionally, all-foreign families have on average a significantly lower monetary income, a slightly lower monetary expenditure and a significantly lower saving rate.

Private consumption of foreign families has a larger (relative) impact in gross output and gross value added, and a lower (relative) impact in imports and employment. This result means that foreigners tend to consume, compared to nationals, relatively more goods and services produced/supplied by sectors with higher national value added and lower imported and labour content, which points to a positive demand led macroeconomic effect of a larger proportion of immigrants in Portugal, for the same size of population. This demand effect illustrates how, besides through the extensive margin, the differential final demand of immigrants contributes for the expansion of the economy.

Furthermore, the higher regional impacts on gross value added and employment are in Lisboa and Norte and the lower regional impacts are in R. A. Açores and R. A. Madeira.

In this study, data from *IDEF 2010/2011* and the *Matriz de Produção Nacional* (Domestic Flows Table) of 2013 are used. It is possible that the specific numeric results might have been different if we had used the latest *IDEF* (2015/2016) and more recent Input-Output tables (2015). However, we believe that main conclusions would have not changed.

In fact, what we have demonstrated is that different types of families have different consumption structures and those different consumption structures generate different macroeconomic impacts. These conclusions show that we need to consider the composition of the population and not only its size to estimate macroeconomic impacts and that immigrants, besides a quantitative effect associated to its number, also have a quantitative impact associated with its different patterns of expenditure.

In the next stage of our research, other consequences of migration will also be studied, namely, among others, supply side effects (labour force, wages and profits, productivity), effects on government budget and social security revenues and expenditure, or effects on demographic trends.

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