

**Is it worth moving from Brazil to Spain or to Portugal? The impact of migration on
Brazilian workers from a social security perspective**

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Abstract

Despite the growing relevance of migration between countries, little has been studied about their relevance to the pension system. In order to explore this gap, this article quantifies, the impacts of the migration of Brazilian workers to Spain or to Portugal, considering the different pension system rules with respect to contribution and benefits, and considering the international social security agreements. Widely used pension indicators are calculated, such as the Replacement Rate, Internal Rate of Return and the Required Contribution Rate, by gender and income levels. A new indicator is proposed, to measure the variation in the required contribution rate to fund the retirement benefit, because of the migration. In the basic scenario, the representative individual enters the labor market when he/she is 18 years old and migrates after 10 years. In the new country, the salary is the same as in Brazil, calculated as a multiple of the minimum wage. In this case, the Brazil-Spain migration is advantageous, as there is an increase in the benefit, in the Replacement Rate and in the Internal Rate of Return. On the other hand, the Required Rate is lower for the migration to Portugal. In this country, the *Transferred Contribution* is higher (compared to Spain), because the contribution rate is lower than in Brazil. We also made two additional exercises, changing relevant parameters. The first is the postponement of the migration to 38 years. There are no relevant changes in the pension indicators, mainly because the benefits calculation rule. In the second exercise, the salary changes in the country of destination. If there is an increase of 50%, as expected, all the pension indicators also increase, with higher rate in Portugal compared to Spain. When the salary decreases 50% in the new country, the losses are higher for high-income workers. The replacement rate increases, but the Internal Rate of Return and the Required Contribution Rate decrease. Taken as a whole, our results bring some evidence that the features of the pension system are relevant for the decision of migrate to another country.

1. Introduction

There has always been displacement of individuals between different locations throughout history. Migrating processes were important for the constitution of several nations. More recently, the globalization process has caused asymmetries in the migratory process, particularly with the increase in the proportion of low income and low qualification workers (Czaika & de Haas, 2014). In view of that, the transit of workers who have worked part of their labor life in their country of origin, migrated during active life and retired in their country of destination, can be relevant for social protection policies.

The number of international migrants increased by 60% in 25 years. In 1990, this number represented about 153 million people, increasing to about 244 million in 2015. International migrants totaled around 3.3% of the world's population in 2015, against 2.9% in 1990 (United Nations, 2016). The intensification of the migration dynamics is inserted in the discussion about social security systems, calling the attention of the International Social Security Association (ISSA, 2010). For that organization, the seven main demographic changes are aging, migration, changes in family structures, changes in the labor market, urbanization, life-cycle desynchronization and changes in social structure. This qualification already evidences the relevance of the migration process because the migrant is expected to be placed in the structure of social protection of the country of destination.

International migrating flow is also related to elements of foreign policy of the countries. International agreements of social security are evidence of it, agreements celebrated between two countries (bilateral) and/or more countries (multilateral) with the intention to preserve social security rights of migrant workers. Today, Brazil has bilateral agreements with Germany, Belgium, Cape Verde, Chile, South Korea, Spain, France, Greece, Italy, Japan, Luxembourg and Portugal, as well as a Mercosul multilateral agreement (that includes Argentina, Uruguay and Paraguay).

Migration is also part of the domestic political agenda in Brazil. On May 24, 2017, the new Migration Law was approved, regulating the entrance and permanence of foreigners in the country, revoking the Foreigner Statute Law created in 1980. This Statute Law had as main purpose the national security of the country. However, the new law focuses on human rights, with equal rights for the migrants (Martins & Barbon, 2017).

There is a case of particular interest to the social security: individuals who migrate during active life. Those contribute for the social security partly according to the rules of the country

of origin and partly to the country that has received them, where they are able to retire. Considering that social security rules are different, it is possible that there is some type of cross-subsidy, because the amount of contributions can amount to more or less than the necessary to fund the pension benefit. Both revenues and social security expenses may be affected.

Based on this scenario, this article analyses and quantifies the impacts arising from the migration of Brazilian workers to Spain and to Portugal. A simplified life-cycle mode is used with the intention of assessing the impacts due to migrations. The values of pension benefits and Pension Indicators are calculated, such as the Replacement Rate, Internal Rate of Return and Required Rate. In addition, so that it is supposed to be original, an index to measure the variation in the contribution required to fund the benefit due to migration is proposed.

The article consists of five sections, including this introduction. The second section presents the theoretical foundation about social security systems and the migratory process. Section 3 describes the methodological procedures. Section 4 states the results. Finally, section five introduces the conclusions of the article.

2. Fundamentação Teórica

This section addresses some conceptual aspects of social security systems. Next, some of the main theories about the migratory process are presented and in the third part, we discuss the relation between social security and migration.

2.1. Social security systems

Social security can be defined as a set of programs encompassing health, pension, social assistance and unemployment protection, (International Labor Organization (ILO), 2014) with pension system being the highlight among its components. It is a complex social contract of risk management linked to income generation and replacement with emphasis on old age. It has an intertemporal nature, which is mediated by the government, with several overlapping generations and different dimensions of heterogeneity.

Pension systems have multiple functions, according to what the classic text of Barr & Diamond (2006) indicates. There are four primary objectives: consumption smoothing, insurance provision, poverty relief and income redistribution. Consumption smoothing is an individual process of income transfer from active to retired years, in order to build an optimum path of consumption throughout a person's life cycle, providing economic safety in old age. In turn, the objective of insurance consists of the fact that social security is a mechanism of risk grouping, by which the individuals can prevent, collectively and more efficiently, from a series

of uncertainties, whether in relation to unexpected events during life or to the duration of life. Poverty relief is due to the possibility of the social security system to provide income for poor senior individuals, and/or those who had not saved enough to provide for their expenses in old age. Income redistribution can occur in two ways: intergenerational or intragenerational. Economic growth and reduction of distortions in funds allocation are the secondary objectives.

In short, there are two dimensions to classify pension systems: as to organization and from the relation between contributions and benefits. In the first case, according to Pallares-Miralles, Romero, & Whitehouse (2012), social security systems can be classified in *pay-as-you-go* (PAYG) schemes or *fully-funded* (FF) schemes. In PAYG schemes, the benefits paid to the inactive are funded by the contributions of the active individuals in the same period, while in FF schemes there is an individual accumulation of funds, i.e., the active individual funds his own future benefit.

In the second case, according to Barr & Diamond (2006), the systems can be classified as defined benefit (DB) or defined contribution (DC). In DB mode, the benefit to be received is previously defined by rule, linked to the individuals' income history. In DC schemes, the benefit is defined according to the contributions made and the rate of return over the reserves accumulated in the period. In general, PAYG schemes fit in the defined benefit (DB) mode and FF schemes in the defined contribution (DC) mode.

2.2. Migrations

According to a broad definition given by Lee (1966), migration can be understood as a change of permanent or semi-permanent residence. Such implies on an origin, a destination and a set of obstacles. The migratory process is complex and multifaceted. In view of that, a single theoretical approach cannot explain it. Skeldon (2012) is an author in line with that reasoning. Essentially, migrating theories have been based on microeconomic grounds (the analysis focus on the individual) and macroeconomic grounds (which consider structural factors between regions). Comprehensive reviews of these theories can be found in Massey et al. (1993), Santos, Barbieri, Carvalho & Machado (2010) and mainly Bodvarsson and Van den Berg (2013).

Although the last two authors indicate that the work of Adam Smith contains elements concerning migration, according to Campos (2015), Ravenstein (1889) can be considered the pioneer of migration studies. In his work "The laws of migration", Ravenstein sought to conceive general laws to understand migrations based on data from the United Kingdom General Census of 1871 and 1881. The main reason verified for migration was economic issues,

such as searching for better-paid jobs. In the twentieth century, the work of reference is Lee (1966), who proposes a *push-pull* model, where migrations are associated with positive factors (*push*), which are able to attract migrants, and negative factors (*pull*), responsible for their repulsion.

Contributions of Lewis (1954) and Ranis & Fei (1961) are centered in issues related to economic development, with the migration of workers from rural to urban area, attracted by the industrialization process. Thus, migration is originated from the labor market. The displacement of workers would occur from regions with low salaries and plenty of workers to regions with high salaries and scarcity of workers. According to this perspective, when eliminating the income differential, migration would tend to cease.

Massey et al. (1993) indicate that the works of Sjaastad (1962) and Todaro (1969) place microeconomic grounds into migrating theories: individuals reasonably evaluate marginal costs and advantages associated with migration. Migration would occur if there were a positive financial return from the displacement. In addition to the difference of income, differences in labor indexes are relevant factors as well. Later on, the literature has an important addition with the incorporation of models inspired by the Theory of Human Capital (Becker, 1975). Individuals analyze the costs and returns of their choices and invest in themselves (as qualification and professional training). From this perspective, migration is understood as an investment in human capital.

The New Economics of Migration also evaluates the migrating phenomenon based on economic grounds, despite having distinct theses of the neoclassic models. According to Massey et al. (1998, cited by Campos, 2015), the decision to migrate is not individual, but collective within families or households. Individuals act collectively, not only with the intention of maximizing the expected incomes, but also of minimizing economic risks and uncertainties.

Finally, there are theoretical strands that consider social and cultural factors as determinants to migrations. One strand points out the role of social networks. According to Massey et al. (1993), social network is a set of interpersonal bonds connecting migrants, former migrants and non-migrants in origin and destination areas. These networks constitute a type of social capital through which individuals are able to access the labor market abroad. For Taylor (1986, p. 196, cited by Campos, 2015), social networks reduce the risk when providing relevant information to the migrants.

This short literature review allows to conclude that a single theory is not able to explain thoroughly the migrating phenomenon, which is better understood by the combined use of more than one theoretical framework. Interpretations based on economic aspects emphasize the role of the salary differences between origin and destination areas. In this case, the decision to migrate, whether individual or collective, aims to maximize the expected incomes. However, other concepts supplement such understanding when enlightening about the role of social interactions as a way to assist and encourage possible migrants. It is possible to deduce that the literature does not contemplate a determinant role for the structures of social protection in the migration process, particularly regarding social security. This gap, explored in the next section, is the key motivator for this article.

2.3. Social security and migrations: a relation (still) underexplored

Although there is a significant set of works about social protection (with emphasis on social security) and about migratory processes, the literature associating both subjects still seem to be in an initial stage. This fact goes against to the one exposed in the International Social Security Association (ISSA) (2016), which indicates protection to migrants as one of the ten challenges for social security systems. In some manner, it seems organizations, such as the International Labor Organization, are more concerned about this subject than the academy.

One of the first works to call attention to agreements on social protection was Tamagno (1994). The author indicates that the intensification of the migration process between developed countries in 1970 and 1980 (to the detriment of the migration in countries with lower income) was motivated in part by a net of common protection, which have been on since the 1950s. Nevertheless, in the end of the twentieth century, the migrating flow from less developed countries has intensified. However, in this case, the number of agreements was much reduced, which generated a coverage gap with concerning social impacts. The author points out that there are four basic elements for an agreement of social security protection: technical basis, reciprocity, financial solvency and administrative capacity.

In the following decade, Forteza (2010) returned to the subject, focusing mainly on the relation between the protection agreements and the mobility of workers in the Caribbean. Two points deserve to be highlighted in his work. First, to call attention for eventual losses that could occur during migration due to the differences of social security rules contemplated improperly in the agreements. Second, to assume that such differences could lead to some type of crossed subsidy between the signatory countries. In line with that, Sabates-Wheeler & Koettl (2010) enlighten the lack of social protection associated with the South-South migrations. Authors

bring out issues such as failures in social security schemes in the low-income countries, in addition to the lack of portability of rights. Among the main recommendations of this policy paper, there is the creation of an integrated social protection net in association with migratory policies. The urgency of these indications is reinforced by Avato, Koettl, & Sabates-Wheeler (2010), who affirm that there were almost 187 million migrants in the early 2000s. In the same line of thinking, Fornalé (2017) points out, based on the experience of Mercosul and of Asean (Southeast Asia), that the agreements are multilateral and not only between two countries.

Recently, new contributions, perhaps motivated by the increase in the migrating flow to the European continent, have expanded the literature, with the works of Robert Holzmann (Holzmann, 2016; Holzmann, Wels e Dale, 2016a; b; c; d) standing out. These papers analyze the portability of social security benefits in four South-North migratory corridors (Turkey-Austria, Turkey-Germany, Morocco-Belgium and Morocco-France). The assessment was undertaken based on criteria of individual fairness, fiscal fairness, and bureaucratic effectiveness. In relation to the first, migration movements should not generate retirement benefits lower than those the worker would have if he had stayed in his country of origin. Fiscal fairness determines that no country must obtain fiscal advantages or be harmed because of an international social security agreement. Bureaucratic effectiveness refers to the low bureaucratic burden, availability of information and the retirement application to be easy for the migrants.

The set of works discussing the relation between the social security systems is much reduced. Cohen & Iams (2007) assess the adequacy of the social security benefits of the US social security for individuals born in the country and for immigrants. The most important conclusion is that for individuals of the second group, the pension indicators (internal rate of return and the relation between benefits and contributions are lower to natives, even though they have been increasing to younger generations). Bridges & Choudhury (2008) reached a similar conclusion about the difference between natives and migrants when they examined only those who were near retirement age. On the other hand, Sevak & Schmidt (2014), consider that in the extent that the observable characteristics are controlled, the liquid social security wealth of the migrants is higher.

From this literature review, it can be noticed that there is a gap to be explored: the lack of works applying quantitative methodologies to analyze together the matters related to migrations and social security. In addition, most of the articles focuses on conceptual aspects of portability of social security benefits. According to Holzmann & Werding (2015), the topic lacks studies

from experts in the social protection field. On the one hand, there are contributions with juridical perspective about the protection treaties. On the other hand, there is a set of works about specific subjects. For example, there are authors attempting to relate the social security system with popular support to the entrance of new migrants (Lacomba e Lagos, 2010; Liddo, Di, 2018). There are also contributions about the effects of migration over the revenues and expenses of the social security systems (Collado, Iturbe-Ormaetxe e Valera, 2004; Laboré, 2018). The works presented in the previous paragraph deal specifically with the comparison between migrants and natives. However, no relevant contributions were found in the literature review emphasizing particularly distributive issues and cross funds from the perspective of workers, such an important issue in the social security literature. In particular, it seems that the relation between the pension indicators and the decision of migrating have not been approached yet. Thus, it is considered that there is a gap to be explored.

In the present article, the theoretical framework is related to the literature with economical micro-foundation in the tradition originated from the works of Becker (1975), Sjaastad (1962) and Todaro (1969). Migration is conceived as an individual decision, in which the worker evaluates the costs and economic advantages from the decision. In this analysis, two basic aspects to the social security systems are considered: the social security contributions made (in origin and destination countries) and the amount of retirement benefits received at country of destination. For such purpose, the usual pension indicators are calculated and presented in the next section.

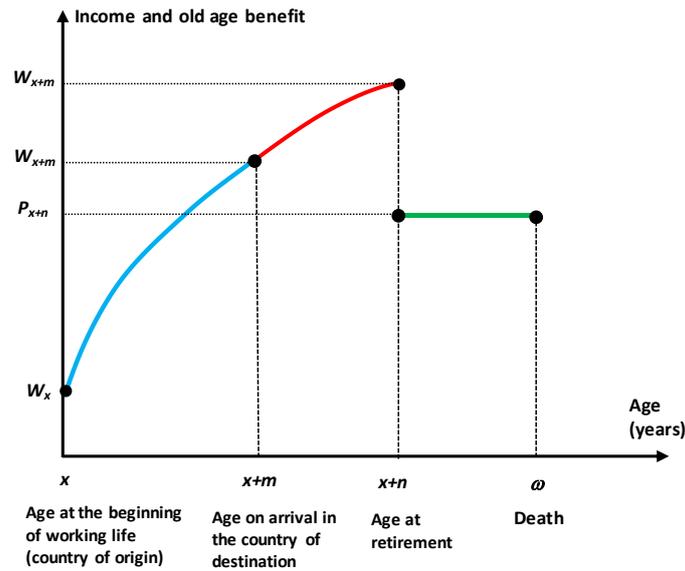
3. Methodology

This section introduces the four stages of methodological procedure of the article. First, to represent the events throughout active and retired life of the migrating worker. The second stage consists of reporting the social security rules of the three countries. The third stage corresponds to the definition of the pension indicators used in the calculations. Finally, the assumptions applied are explained.

3.1. Life cycle of the migrating worker

The path of the incomes, contributions and social security benefits of a worker can be understood with a simplified life cycle model, in the tradition initiated by Modigliani & Brumberg (1954). In this paper, we apply the methodology of representative worker, just as applied by Forteza & Ourens (2009). Figure 1 shows a representation of this model, already incorporating the migration during active life.

Figure 1 - Life cycle of a representative migrant worker



The individual begins his labor life in the country of origin with an x age and income W_x . His (her) income increases with his experience at the labor market, according to stylized facts of the literature. With the age $x+m$, the worker migrates permanently to another country. By simplification, it is shown a particular case in which there are two assumptions about the income: monotonic growth during active life (at the same rate, before and after migration) and the non-existence of discontinuity (an increase or a decrease in the income). The individual stays in the labor market and retires with $x+n$ years. From that moment on, he receives a pension benefit of constant real value until his death, with terminal age ω .

3.2. Social security rules

After representing the simplified life cycle pertinent to the social security, it is necessary to present the social security rules of the three countries. Three pieces of information are important: calculation of contributions, retirement age and the calculation method for the benefits. By comparison, it is assumed that the representative workers are in the urban formal private sector. These workers must comply with the minimum requirements to request a Retirement for Contribution Time (ATC) from *Regime Geral de Previdência Social* (Brazilian case) and Retirement for Contribution Time and Minimum Age (Portuguese and Spanish cases).

Portugal and Spain have international social security agreements with Brazil, both in force since 1995. These agreements grant the recognition of the contributive period for migrants who have contributed in both signatory countries. The concession of benefits must follow the law terms of the country of destination (Previdência Social, 2017a).

3.2.1. Brazil

In Brazil, the contribution rate levies on the salary of contribution, a remuneration between the minimum salary of R\$ 937.00 and maximum salary of R\$ 5,531.31 (amounts in force in 2017). The employer contributes with 20% of the worker's salary, with no limits. For the worker, the rate varies according to the income. For the contribution salary of up to R\$ 1,659.38 the rate is 8%; from R\$ 1,659.39 to R\$ 2,765.66 the rate is 9% and for amounts between R\$ 2,765.66 and R\$ 5,531.31, the rate is 11%.

Retirement for Contribution Time (*ATC*) only requires a minimum contribution time of 30 years for women and 35 years for men. The benefit amount is calculated by multiplying the *M* average of the 80% highest salaries of contribution by the *Social Security Factor f*, as expressions 1 and 2 show. In those expressions, *TC* is the contribution time; *a* is the contribution rate (set in 0.31); *Es* is life expectancy and *Id* is actual age, both at retirement time. To calculate the factor, five years to women's contribution time are added. In 2017, the minimum and maximum amounts of the benefits were the same as the minimum and maximum of the salary of contribution.

$$Pension = M \cdot f \quad (1)$$

$$f = \frac{TC \cdot a}{Es} \left(1 + \frac{Id + TC \cdot a}{100} \right) \quad (2)$$

Law 13.183 changed the application of the factor, with the creation of *Rule 85/95 Progressive*. In this point system, if at retirement time, the sum of age *Id* and the contributive time *TC* is less than 85 (women) and 95 (men), it is mandatory to apply the factor; otherwise, the factor will only be applied if it is advantageous for the worker. (Previdência Social, 2017b). Initial numbers of 85/95 will increase until 2026, when the sum for women shall result in 90 and for men in 100, according to table 1. In 2017, the minimum and maximum amounts of the benefits were R\$ 937.00 and R\$ 5,531.31, respectively.

Table 1 - Rule 85/95 Progressive (sum age plus years of contribution) - Brazil

Period	Woman	Man
2017-2018	85	95
2019-2020	86	96
2021-2022	87	97
2023-2024	88	98
2025-2026	89	99
2027 onwards	90	100

Source: Previdência Social (2017b)

3.2.2. Spain

In Spain, the social security levies on the salary of contribution, a remuneration between the minimum of €825 and €3,642. The employer contributes with 23.60% and the worker with 4.70% (Social Security Administration (SSA) & International Social Security Association (ISSA), 2016). In 2017, the worker who reached the minimum age of 65 should have accomplished at least 36.3 years of the contributive time to apply for retirement. This minimum time will increase progressively until 2027, according to table 2 (Ministerio de Empleo y Seguridad Social, 2017).

Table 2 - Minimum contribution time - Spain

Years	Contribution time (years)	Minimum age (years)
2017	36,3	65
2018	36,6	65
2019	36,9	65
2020	37,0	65
2021	37,3	65
2022	37,6	65
2023	37,9	65
2024	38,0	65
2025	38,3	65
2026	38,3	65
2027 onwards	38,6	65

Source: Ministerio de Empleo y Seguridad Social (2017)

The benefit of retirement is calculated by applying a normative basis, which is the result of the division of the salaries of contribution during the n months prior to the retirement by a divider x . This factor will also have boosts, until 2022, increasing from the current 240 computable months and the 280 divider, for 300 computable months and 350 divider, according to table 3 (Ministerio de Empleo y Seguridad Social, 2017). In 2017, the minimum and maximum amounts of the benefits were €637.70 and €2,573.70, respectively.

Table 3 - Normative basis - Spain

Year	Number of computable months	Divider	Computable years
2017	240	280	20
2018	252	294	21
2019	264	308	22
2020	276	322	23
2021	288	336	24
2022 onwards	300	350	25

Source: Ministerio de Empleo y Seguridad Social (2017)

3.2.3. Portugal

In Portugal, the contribution rates are 23.75% over the employer and 11% over the employee. The sum of both finances the old age, disability, illness, death or maternity benefits. For the benefits of Retirement for Contribution Time and Minimum Age, the rates of employer and employee are 13.81% and 6.40%, respectively (Social Security Administration (SSA) & International Social Security Association (ISSA), 2016). The computation of the minimum age for retirement changed in 2014. According to the Instituto da Segurança Social (2017), the minimum age for retirement started to vary depending on the average life expectancy at 65 years of age. In 2017, the minimum age was 66.3, adding one month each year. In addition to the minimum age, it is also necessary to have at least 15 years of contributive time.

The old age benefit is calculated by multiplying the Remuneration of Reference RR by the Global Rate of Formation (TGF), as equation 3 presents (Instituto da Segurança Social, 2017). The amount of RR results from the division between the total of remunerations of the contributive time of the individual by the result from the number of civil years with record of remunerations n (civil year is when there are at least 120 days of remunerations) by 14, as introduced in equation 4 (Instituto da Segurança Social, 2017).

$$Pension = RR.TGF \quad (3)$$

$$RR = \frac{TR}{n.14} \quad (4)$$

To calculate the TGF , it is considered the total number of civil years with record of contributions. The rate to be applied each year depends on the contributive history of the worker (Instituto da Segurança Social, 2017). If the contribution time is less or equal to 20 years, a 2% rate will be applied. Otherwise, the rate varies from 2% to 2.3%, according to the relation between the Remuneration of Reference with the Social Support Indexing (IAS), in the amount of €421.32, according to table 4.

Table 4 - Variable rate by year of contribution, according to the Reference Income (RR)

Remuneration of Reference (RR) per IAS indexing	Rate (%)
Up to 1,1xIAS	2.30
1.1 x IAS < RR ≤ 2 x IAS	2.25
2 x IAS < RR ≤ 4xIAS	2.20
4 x IAS < RR ≤ 8xIAS	2.10
RR > 8xIAS	2.00

Source: Instituto da Segurança Social (2017)

The minimum amount of the benefits varies according to the contribution time of the worker. For those with contribution time of less than 15 years, the minimum amount of the benefit is €264.32, for the range of 15 to 20 years of contribution, the minimum amount is of €277.27, for the range of 21 to 30 years, the minimum amount is of €305.96 and above that range the minimum amount is of €382.46.

3.3. Pension indicators

One challenge of the literature about social security is the comparative evaluation of social security systems and their effects on the beneficiaries (Dixon, 1998; Neysmith and Aronson, 2012). Three indicators of the social security literature are used to quantify the effects of migration on the workers: *Replacement Rate (RR)*, *Internal Rate of Return (IRR)* and *Required Contribution Rate (ReqRate)*.

Replacement Rate *RR*, presented in equation 5, is a relative measure of the real purchasing power. It is given by the relation between the first benefit received, B_{it} and the last remuneration before retirement, W_{it-1} (Afonso, 2016).

$$RR_i = \frac{B_{it}}{W_{it-1}} \quad (5)$$

The Replacement Rate *RR* is, despite its simplicity and being an immediate *proxy* of purchasing power, are an incomplete measure to evaluate social security systems (Whiteford, 1995). In view of that, the Internal Rate of Return *IRR*, presented in equation 6, is also used. This is the discount rate which equalizes the amounts present in the contributions (from the beginning of active life until the last contributive time N) and of the benefits received (from the moment of retirement until the terminal age ω (Liebman, 2002). The *IRR* allows that aspects such as different initial working ages or the delayed retirement to be incorporated into the analysis

$$\sum_{t=1}^N \frac{Contribution_t}{(1+IRR_i)^t} = \sum_{t=N+1}^{\omega} \frac{Pension_t}{(1+IRR_i)^t} \quad (6)$$

Finally, the Required Contribution Rate (*ReqRate*), given by equation 7, represents which should be the contribution rate levying on the income, that equalizes the expected present values of pension benefits *VPB* and of the income *VPR*. The higher its value, compared to the actual contribution rate charged over each individual, the higher the actuarial imbalance of the pension system.

$$NecRate_i = \frac{\sum_{t=N+1}^{\omega} \frac{Pension_{it}}{(1+r)^t}}{\sum_{t=1}^N \frac{Income_{it}}{(1+r)^t}} \quad (7)$$

3.4. Assumptions

This work considered only two migrating flows in the calculations: Brazil-Spain and Brazil-Portugal, both during contributive time. The following assumptions were adopted:

- Gender: both genders are considered.
- Initial wage at country of origin: three values in multiples of the minimum salary (MW) are used: 1 MW, 2 MW and 3 MW. In Brazil, initial amounts are respectively R\$ 937, R\$ 1,874 and R\$ 2,811. In Spain, the amounts are €825, €1,650 and €2,475. In Portugal, the amounts are €557, €1,114.00 and €1671.
- Age at the beginning of working life: 18 years old.
- Rate of wage growth and discount rate at country of origin: the wage growth and discount rates are assumed to be the same. Three possibilities were considered: 1%, 2%, and 3% per year.
- Initial wage at country of destination: it can assume a smaller, equal or higher amount in relation to the last wage at country of origin. Three variations were considered in relation to the last wage at country of origin: -50%, 0% and +50%.
- Age of arrival at country of destination: represents the age when migration occurs. Two possibilities were considered: that the migration occurs 10 or 20 years after entering in the labor market.
- Migration occurs only once, during labor time.
- Rate of wage growth at country of destination: it was considered that after migration there is no change in relation to the rates adopted at country of origin.
- Contribution density: it is assumed that there is no interruption in the contributive time during active life, i.e., the contribution density is 100%.
- Contribution: rates of contribution of the worker and employer follow the rules in force in the social security system of each country. In addition, it is assumed that when an individual decides to migrate to another country, the contributive time at the country of origin is recognized at the country of destination.
- Type of benefit: old age benefit; no survivors benefit.

- Eligibility condition: it is assumed that the worker applies for old age benefit as soon as he achieves the minimum necessary requirements (age and/or contribution time).
- Entry into the labor market: it is assumed that the individual enters the labor market in January 2017 with the rules in force for each year.
- Wage and contribution flows at country of destination: it was chosen to index the amounts of wage and contributions to the minimum wage (MW) in force. For example, an individual with an income of 1.5 MW (in BRL) in Brazil, who migrates to Spain, does not notice a variation in his income at the country of destination. Thus, his income at the European country is equivalent to 1.5 MW (in €). Similarly, if the same individual had contributed in the amount of 30 MW (in BRL) at country of origin, when he migrates to country of destination, the amount of contribution transferred would be equivalent to 30 MW (in €). This choice was made to minimize possible distortions arising from the differences of per capita income between the countries.

4. Results

4.1. Base scenario

This section describes the results of the Pension indicators described in section 3. First, Tables 5, 6 and 7 report the figures in the base scenario. This is the referential situation of a worker entering the labor market when he (she) is 18 years old and remains all his life in each of the three countries. The results are presented for the three initial income levels (1, 2 and 3 MW) and for the three rates of wage growth (1, 2 and 3%). The results for Brazil were presented in distinct columns for man (M) and woman (W), because the minimum contributive number of years is different among genders. All the values reported are in monthly terms.

It is observed that in the three countries, the Replacement Rate (*RR*) is higher for individuals with lower initial income. There are two explanations for that. First, social security systems have explicit redistributive characteristics, as discussed by Gustman & Steinmeier (2001). The second explanation, particularly valid for Brazil, is that the calculated old age benefit would be less than the minimum social security benefit, forcing its increase. These results meet the previous findings of Caetano (2006).

The Internal Rate of Return (*IRR*) values have the same interpretation; i.e., individuals with lower initial income have the highest *IRRs* and those with higher initial income receive lower *IRRs*. In relation to the Required Rate (*ReqRate*), the values, in most cases, are higher

than the actual rates, with a negative and worrisome highlight by the differences found in relation to the rates actually charged.

Table 5 - Pension values and Pension indicators – Non-migrant workers - Brazil

Initial age	Initial income (BRL)	Income growth rate (%)	Age/CT		Pension (BRL)		Pension indicators					
							RR (%)		IRR (%)		ReqRate (%)	
			M	W	M	W	M	W	M	W	M	W
18	937	1	53/35	48/30	937	937	70.65	74.25	3.67	4.61	75.85	100.60
	1,874				1,488	1,215	56.1	48.13	2.94	3.22	60.23	65.18
	2,811				2,232	1,822	56.1	48.13	2.76	3.03	60.23	65.18
18	937	2	53/35	48/30	937	937	50.09	55.3	3.23	4.22	43.78	59.85
	1,874				1,847	1,460	49.36	43.08	3.02	3.3	43.15	46.62
	2,811				2,770	2,190	49.36	43.08	2.91	3.17	43.15	46.62
18	937	3	53/35	48/30	1,151	937	43.75	41.3	3.32	3.77	31.74	36.54
	1,874				2,301	1,760	43.75	38.78	3.32	3.39	31.74	34.31
	2,811				3,452	2,639	43.75	38.78	3.12	3.33	31.74	34.31

Source: Authors' calculations

Table 6 - Pension values and Pension indicators – Non-migrant workers - Spain

Initial age	Initial income (€)	Income growth rate (%)	Age/CT		Pension (€)		Pension indicators		
							RR (%)		IRR (%)
			M/W	M/W	M/W	H/M	H/M		
18	825	1	65/47	999	999	75.92	2.31	47.81	
	1,650			1,998	1,998	75.92	2.31	47.81	
	2,475			2,573	2,573	65.20	1.95	41.06	
18	825	2	65/47	1,413	1,413	67.66	2.65	36.38	
	1,650			2,573	2,573	61.60	2.43	33.12	
	2,475			2,573	2,573	41.07	1.74	22.08	
18	825	3	65/47	2,003	2,003	60.67	2.99	28.15	
	1,650			2,573	2,573	38.98	2.13	18.09	
	2,475			2,573	2,573	25.98	1.66	12.06	

Source: Authors' calculations

Table 7 - Pension values and Pension indicators – Non-migrant workers - Portugal

Initial age	Initial income (€)	Income growth rate (%)	Age/CT		Pension (€)		Pension indicators		
							RR (%)		IRR (%)
			M/W	M/W	M/W	H/M	H/M		
18	557	1	70/52	751	751	79.98	2.60	38.87	
	1,114			1,477	1,477	78.63	2.56	38.21	
	1,671			2,171	2,171	77.05	2.51	37.44	
18	557	2	70/52	997	997	63.32	2.73	26.88	
	1,114			1,948	1,948	61.83	2.67	26.25	
	1,671			2,875	2,875	60.84	2.63	25.83	
18	557	3	70/52	1,351	1,351	51.37	2.87	19.21	
	1,114			2,622	2,622	49.86	2.79	18.64	
	1,671			3,840	3,840	48.69	2.72	18.21	

Source: Authors' calculations

4.2. Migration

This section introduces the results when migration is incorporated to the analysis. A 28-year-old individual (10 years after entering the labor market) migrates permanently to Spain or

Portugal. At first, it is considered that the initial income at country of destination is the same as the last income at the country of origin, converted by multiples of minimum wage. Similarly, it is assumed that the rate of salary growth is the same in both countries. Tables 8 and 9 report the calculated values, considering the flows of Brazil-Spain and Brazil-Portugal, respectively. The last column shows the percentage *Variation* between the *Transferred Contribution* and the *Required Contribution* to finance the old age benefit at country of destination, obtained by the difference between the two factors, divided by the second.

Transferred Contribution, whose concept is presented herein, represents in percentage terms, the amount of contributions the individual made at country of origin and transferred to the country of destination after migration. *Required Contribution* represents the sum of contributions that the individual would have made throughout his active life at country of origin, but calculated according to the rules in force at country of destination. This way, the amounts calculated in the last column to the right of tables 8 and 9, according to the expression 8:

$$\text{Variation (\%)} = \frac{-\text{Required Contribution} + \text{Transferred Contribution}}{\text{Required Contribution}} \cdot 100 \quad (8)$$

**Table 8 - Pension values, Pension indicators and Contributive variation
Base scenario – Migration Brazil-Spain**

Initial income (BRL)	Income growth rate (%)	Age/CT	Pension (€)	Pension indicators			Variation between the transferred contribution and the required contribution (%)
				RR (%)	IRR (%)	ReqRate (%)	
				M and W	M and W	M and W	M and W
937	1	65/47	998	75.92	2.32	47.81	-1.06
1,874			1,996	75.92	2.30	47.81	2.47
2,811			2,573	65.25	1.89	41.09	9.54
937	2	65/47	1,411	67.66	2.66	36.36	-1.06
1,874			2,573	61.70	2.42	33.16	2.47
2,811			2,573	41.13	1.69	22.11	9.54
937	3	65/47	1,998	60.67	2.99	28.14	-1.06
1,874			2,573	39.07	2.12	18.12	2.47
2,811			2,573	26.05	1.61	12.08	9.54

Source: Authors' calculations

In the first line of table 8, there is an individual who entered the labor market in Brazil when he was 18 years old with an initial income of 1 MW, with 1% growth rate per year. At 28 years old, he (she) migrates to Portugal. For this worker, three Pension indicators are calculated, similar to what tables 5, 6 and 7 present. At country of origin (Brazil), the number of contributions throughout the active life would have been 35.31 MW (*transferred contribution*).

If the individual were at country of destination (Spain) – under the same assumptions adopted at country of origin – he would have contributed with 35.69 MW (*required contribution*). In this case, the variation between transferred and required contribution is of -1.06%, because the amount of contribution accumulated at the country of origin is less than the amount of required contribution, according to the rules at destination country. All the amounts of the last column are below 10%, which can be interpreted as evidence of similarity of rules of the social security systems. This does not mean that this similarity shows that both pension designs are adequate, given the deficits verified in the works of Afonso (2018), for the Brazilian case, and Díaz-Gimenez & Díaz-Saavedra (2017), for Spain. Next, table 9 shows the results of Brazil-Portugal migration.

**Table 9 - Pension values, Pension indicators and Contributive variation
Base scenario – Migration Brazil-Portugal**

Initial income (BRL)	Income growth rate (%)	Age/CT	Pension (€)	Pension indicators			Variation between the transferred contribution and the required contribution (%)
				RR (%)	IRR (%)	ReqRate (%)	
				M and W	M and W	M and W	M and W
937			638	67.96	2.00	33.02	38.55
1,874	1	70/52	1,255	66.88	1.94	32.49	43.49
2,811			1,853	65.83	1.85	31.99	53.39
937			880	55.96	2.22	23.75	38.55
1,874	2	70/52	1,724	54.80	2.15	23.26	43.49
2,811			2,539	53.81	2.06	22.84	53.39
937			1,226	46.73	2.44	17.46	38.55
1,874	3	70/52	2,383	45.44	2.35	16.98	43.49
2,811			3,499	44.48	2.25	16.62	53.39

Source: Authors' calculations

When comparing tables 8 and 9 with tables 5, 6 and 7, it can be noticed that, generally, the *RR* for individuals who decided to migrate (to either Spain or Portugal) is higher in relation to those who stayed in Brazil until retirement. *RR* was lower only for the individuals with initial income of 1 MW and 1% growth rate who migrated to Portugal. Staying in Brazil, the *RR* would be of 70.65% for men and 74.25% for women. Migration makes *RR* be of 67.96% for both genders.

The last column figures are worth the focus. The variation between required and transferred contribution is predominantly positive in both migratory flows, because the contribution rate in Brazil (28% to 31%) is higher compared to the rates in Spain (28.3%) and in Portugal (20.21%), which results in an higher amount of transferred contribution than the

amount of required contribution. This increase in the required contribution generates a reduction in the *ReqRate*, as it can be noted by comparing tables 6 and 8; and 7 and 9. As the Portuguese rate is lower than the Spanish one, the figures of the last column of table 9 are much higher (average of 45%) than the ones of table 8 (average below 4%), demonstrating the need of a higher compensation to fund social security benefits.

4.3. Extensions

This section uses the same methodology, and some extensions are made, with some changes in assumptions previously adopted.

4.3.1. Migration at the age of 38

The first extension is the increase in migration age, from 28 to 38, i.e., 20 years after entering the labor market. Tables 10 and 11 present the results to be compared, respectively, with tables 8 and 9.

**Table 10 - Pension values, Pension indicators and Contributive variation
Migration at 38 years Brazil-Spain**

Initial income (BRL)	Income growth rate (%)	Age/CT	Pension (€)	Pension indicators			Variation between the transferred contribution and the required contribution (%)
				RR (%)	IRR (%)	ReqRate (%)	
				M and W	M and W	M and W	
937	1	65/47	998	75.92	2.33	47.80	-1.06
1,874			1,996	75.92	2.28	47.80	2.47
2,811			2,573	65.25	1.84	41.08	9.54
937	2	65/47	1,411	67.66	2.66	36.35	-1.06
1,874			2,573	61.70	2.40	33.15	2.62
2,811			2,573	41.13	1.63	22.10	9.55
937	3	65/47	1,998	60.67	2.99	28.12	-0.92
1,874			2,573	39.07	2.08	18.11	5.34
2,811			2,573	26.05	1.51	12.08	14.18

Source: Authors' calculations

In relation to the results of the Brazil-Spain migrating flow in tables 8 and 10, it is noticed that there is little sensitivity in the value of the old age benefit. Such occurs, specifically, because the rate charged in Brazil (28 to 31%, summing employee and employer) is very similar to what is observed in Spain (28%). Consequently, the other indicators also did not suffer significant changes.

**Table 11 - Pension values, Pension indicators and Contributive variation
Migration at 38 years Brazil-Portugal**

Initial income (BRL)	Income growth rate (%)	Age/CT	Pension (€)	Pension indicators			Variation between the transferred contribution and the required contribution (%)
				RR (%)	IRR (%)	ReqRate (%)	
				M and W	M and W	M and W	
937			70/52	511	54.50	1.32	26.48
1,874	1	65/47		1,007	53.63	1.24	26.06
2,811				1,487	52.82	1.13	25.66
937			70/52	734	46.67	1.61	19.80
1,874	2	65/47		1,437	45.68	1.52	19.38
2,811				2,117	44.87	1.41	19.04
937			70/52	1,057	40.30	1.90	15.06
1,874	3	65/47		2,054	39.15	1.76	14.62
2,811				3,011	38.27	1.66	14.29

Source: Authors' calculations

When comparing tables 9 and 11 (migration to Spain), it is noticed that the increase in the migration age reduces the retirement amount. For example, for an individual with initial income of 1 MW and 1% rate of salary growth of 1% migrating at the age of 28, the retirement amount would be of €638. However, when postponing migration to the age of 38, the benefit takes the amount of €511. Therefore, all the amounts of the indexes suffer a reduction in the order of 17% for the *RR* and *ReqRate* and of 30% for the *IRR*.

4.3.2. Different wage at destination country (50% higher or 50% lower)

In the base scenario and in section 4.3.1, there is no change in the wage during migration. In this section, this assumption is modified. Tables 12 and 13 introduce the results obtained when the income at destination country is 50% higher in relation to the last income at origin country.

In both cases (Brazil-Spain and Brazil-Portugal), as expected, there is an increase in the benefits. The increase is higher in the second case, as in Portugal there is no limit for the benefit amount. Differently, Spain limits the retirement benefit to €2,573.70. Due to the boost in retirement, all the indexes increase. The exception is the case of a highest rate of income growth (3%). Such occurs because the income conjunction at destination country and higher rates make the benefit cap to be reached more quickly. For the Portuguese case, benefits and indexes increase more expressively.

Next, tables 14 and 15 show the effects of a 50% drop in the income during migration. As expected, there is a reduction in the old age benefit in both countries. The highest reductions

occur for the individuals with higher initial income at origin country. As the initial income at destination country is smaller, the difference between the last salary and the amount of the retirement benefit decreases. Thus, the Replacement Rate (*RR*) assumes a higher amount if compared to the base scenario. The reduction in the pension value reflects in the *IRR* and in the *ReqRate*, which also suffer a decrease. It is relevant to point out that, both for Spain or Portugal, there are no changes for the Transferred Contribution because it is calculated based on the period and the amount contributed in the country. Given that there were changes only after migration, the period prior to the change of country was not affected.

Table 12 - 50% income growth in destination country - Migration Brazil-Spain

Initial income (BRL)	Income growth rate (%)	Age/CT	Pension (€)	Pension indicators			Variation between the transferred contribution and the required contribution (%)
				RR (%)	IRR (%)	ReqRate (%)	
				M and W	M and W	M and W	
937	1	65/47	1,497	75.92	2.56	51.46	-1.06
1.874			2,573	65.25	2.17	44.23	2.47
2.811			2,573	43.50	1.66	29.49	9.54
937	2	65/47	2,117	67.66	2.88	39.14	-1.06
1.874			2,573	41.13	1.94	23.80	2.47
2.811			2,573	27.42	1.63	15.86	9.54
937	3	65/47	2,573	52.10	2.86	26.01	-1.06
1.874			2,573	26.05	1.86	13.01	2.47
2.811			2,573	17.37	1.60	8.67	9.54

Table 13 - 50% income increase in destination country - Migration Brazil-Portugal

Initial income (BRL)	Income growth rate (%)	Age/CT	Pension (€)	Pension indicators			Variation between the transferred contribution and the required contribution (%)
				RR (%)	IRR (%)	ReqRate (%)	
				M and W	M and W	M and W	
937	1	70/52	948	67.34	2.23	34.94	38.55
1.874			1,853	65.83	2.16	34.15	43.49
2.811			2,733	64.72	2.08	33.58	53.39
937	2	70/52	1,307	55.40	2.43	25.11	38.55
1.874			2,539	53.81	2.34	24.38	43.49
2.811			3,722	52.59	2.24	23.83	53.39
937	3	70/52	1,811	46.03	2.61	18.37	38.55
1.874			3,499	44.48	2.50	17.75	43.49
2.811			5,135	43.51	2.41	17.36	53.39

Source: Authors' calculations

Table 14 - 50% income decrease in destination country - Migration Brazil-Spain

Initial income (BRL)	Income growth rate (%)	Age/CT	Pension (€)	Pension indicators			Variation between the transferred contribution and the required contribution (%)
				RR (%)	IRR (%)	ReqRate (%)	
				M and W	M and W	M and W	
937	1	65/47	904	75.92	2.25	46.77	-1.06
1.874			998	75.92	1.75	39.41	2.47
2.811			1,497	75.92	1.69	39.41	9.54
937	2	65/47	1,160	67.66	2.53	34.76	-1.06
1.874			1,411	67.66	2.12	29.98	2.47
2.811			2,117	67.66	2.06	29.98	9.54
937	3	65/47	1,490	60.67	2.81	26.23	-1.06
1.874			1,998	60.67	2.48	23.19	2.47
2.811			2,573	52.10	2.12	19.92	9.54

Source: Authors' calculations

Table 15 - 50% income decrease in destination country - Migration Brazil-Portugal

Initial income (BRL)	Income growth rate (%)	Age/CT	Pension (€)	Pension indicators			Variation between the transferred contribution and the required contribution (%)
				RR (%)	IRR (%)	ReqRate (%)	
				M and W	M and W	M and W	
937	1	70/52	579	68.06	1.93	32.43	38.55
1.874			638	67.96	1.41	27.74	43.49
2.811			948	67.34	1.33	27.49	53.39
937	2	70/52	727	56.25	2.11	22.92	38.55
1.874			880	55.96	1.68	19.95	43.49
2.811			1,307	55.40	1.59	19.75	53.39
937	3	70/52	921	47.07	2.28	16.52	38.55
1.874			1,226	46.73	1.94	14.67	43.49
2.811			1,811	46.03	1.85	14.45	53.39

Source: Authors' calculations

5. Final considerations

This work aimed to evaluate quantitatively the impacts arising from migrations for the individuals, through pension indicators. The intention was to explore a gap in the literature, which until now has been focusing on more conceptual issues, in connection with the social protection framework or to juridical aspects intrinsic to the recognition of the contributive period. Cases of *once-for-all* migration from Brazil to Spain and Portugal were analyzed. The work is based on building pension indicators and on literature about migration. More specifically, a line based on the microeconomic foundation from Becker (1975), Sjaastad (1962) and Todaro (1969) was followed, adding to the marginal costs and benefits of migration the possible variations in the amount of the retirement benefit and of other pension indicators.

Migration, either for Spain or for Portugal, causes an increase for retirement benefit of the individual, when compared with the scenario when he decides to stay his entire life in Brazil.

The Replacement Rate (*RR*) is higher for the Brazil-Spain flow, i.e., the reduction in the actual income of the worker after retirement is less when he migrates to Spain, instead of staying in Brazil. Therefore, the comparison of Brazil-Spain and Brazil-Portugal migrating flows – according to the assumptions adopted in the base scenario – indicates that the first migration is more advantageous for the worker.

In order to capture the migration effects over social security, it was proposed the creation of a variation index between the transferred contribution and the required contribution, i.e., the variation between the amount of contributions made at origin country and the amount required during the same period according to the rate in force at destination country, to fund the benefit. It was observed that such is mainly positive in the two migrating flows analyzed because the Brazilian rate is higher than the rates practiced in Spain and Portugal, causing a higher amount of transferred contribution than the required contribution amount.

Two changes in the adopted assumptions in the basic scenario were made: change in age of migration (from 28 to 38) and change in the variation of initial income at destination country (from 0% to -50% and +50%). Results show higher responsiveness of the retirement amount and of pension indicators to the alteration in the initial income at country of destination. When the variation is of -50%, there is a reduction in the retirement benefit amount. However, it is the opposite for the +50% variation, when there is an increase in the benefit amount. In this last case, the migration between Brazil and Portugal is more advantageous, because in Portugal there is no maximum amount of retirement.

This work addresses quantitative aspects less explored in the literature interface about social security and migration. It assumes specially that, an innovation has been introduced, with the index of contributive variation arising from migration. It is considered that such findings might help to give support for the migrating and social protection policies. Further studies may likely extend these horizons by incorporating not only more countries to the analysis but also other elements, such as the expansion of the unit of decision for the family, which would lead to the incorporation of other benefits, such as pensions.

6. References

AFONSO, L. E. Progressividade e aspectos distributivos na previdência social: Uma análise com o emprego dos microdados dos registros administrativos do RGPS. **Revista Brasileira de Economia**, v. 70, n. 1, p. 3–30, 2016.

_____. Reforma Temer: os impactos da PEC 287/2016 sobre o RGPS. *In*: NEGRI, J. A. DE; ARAÚJO, B. C.; BACELETTE, R. (Eds.). **Desafios da nação: artigos de apoio, volume 2**. Brasília: IPEA, 2018. p. 253–284.

AVATO, J.; KOETTL, J.; SABATES-WHEELER, R. Social Security Regimes, Global Estimates, and Good Practices: The Status of Social Protection for International Migrants. **World Development**, v. 38, n. 4, p. 455–466, abr. 2010.

BARR, N.; DIAMOND, P. The Economics of Pensions. **Oxford Review of Economic Policy**, v. 22, n. 1, p. 15–39, 1 mar. 2006.

BECKER, G. S. **Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education**. 2. ed. New York: Columbia University Press, 1975.

BODVARSSON, Ö. B.; BERG, H. VAN DEN. The Determinants of International Migration: Theory. *In*: **The Economics of Immigration**. New York: Springer New York, 2013. p. 27–57.

BRIDGES, B.; CHOUDHURY, S. **Social Security as a Retirement Resource for Near-Retirees, by Race and Ethnicity, Nativity, Benefit Type, and Disability Status** ORES Working Paper Series: ORES Working Paper Series 109. Washington, D.C.

CAETANO, M. A.-R. **Subsídios cruzados na previdência social brasileira**. Textos para Discussão IPEA 1211. Brasília.

CAMPOS, M. B. DE. Seletividade e migração. *In*: BRUNO, M. (Ed.). **População, Espaço e Sustentabilidade: contribuições para o desenvolvimento do Brasil**. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística, 2015. p. 187–202.

COHEN, L.; IAMS, H. Income Adequacy and Social Security Differences between the Foreign-Born and U.S.-Born. **International Migration Review**, v. 41, n. 3, p. 553–578, 24 set. 2007.

COLLADO, M. D.; ITURBE-ORMAETXE, I.; VALERA, G. Quantifying the Impact of Immigration on the Spanish Welfare State. **International Tax and Public Finance**, v. 11, n. 3, p. 335–353, maio 2004.

CZAIKA, M.; HAAS, H. DE. The Globalization of Migration: Has the World Become More Migratory? **International Migration Review**, v. 48, n. 2, p. 283–323, jun. 2014.

DÍAZ-GIMENEZ, J.; DÍAS-SAAVEDRA, J. The future of Spanish pensions. **Journal of Pension Economics and Finance**, v. 16, n. 02, p. 233–265, 6 abr. 2017.

DIXON, J. Comparative social security: The challenge of evaluation. **Journal of Comparative Policy Analysis: Research and Practice**, v. 1, n. 1, p. 61–95, set. 1998.

FORNALÉ, E. Global-regional interaction to extend access to social protection for migrant

workers: Insights from ASEAN and MERCOSUR. **International Social Security Review**, v. 70, n. 3, p. 31–52, jul. 2017.

FORTEZA, A. The Portability of Pension Rights: General Principles and the Caribbean Case. **Development Policy Review**, v. 28, n. 2, p. 237–255, mar. 2010.

FORTEZA, A.; OURENS, G. **How much do Latin American pension programs promise to pay back? Social Protection Discussion Paper**: Social Protection Discussion Paper. Washington, D.C.: [s.n.].

GUSTMAN, A. L.; STEINMEIER, T. L. How effective is redistribution under the social security benefit formula? **Journal of Public Economics**, v. 82, n. 1, p. 1–28, out. 2001.

HOLZMANN, R. Bilateral social security agreements and pensions portability: A study of four migrant corridors between EU and non-EU countries. **International Social Security Review**, v. 69, n. 3–4, p. 109–130, jul. 2016.

HOLZMANN, R.; WELS, J.; DALE, P. **Assessing Benefit Portability for International Migrant Workers: A Review of the Austria-Turkey Bilateral Social Security Agreement**. Social Protection & Labor Discussion Paper 1602. Washington, D.C.

____. **Assessing Benefit Portability for International Migrant Workers: A Review of the Belgium-Morocco Bilateral Social Security Agreement**. Social Protection & Labor Discussion Paper 1603. Washington, D.C.

____. **Assessing Benefit Portability for International Migrant Workers: A Review of the France-Morocco Bilateral Social Security Agreement**. Social Protection & Labor Discussion Paper 1604. Washington, D.C.

____. **Assessing Benefit Portability for International Migrant Workers: A Review of the Germany-Turkey Bilateral Social Security Agreement** Social Protection & Labor Discussion Paper 1606. Washington, D.C.

HOLZMANN, R.; WERDING, M. Portability of Social Benefits: Research on a Critical Topic in Globalization. **CESifo Economic Studies**, v. 61, n. 2, p. 335–345, 1 jun. 2015.

INSTITUTO DA SEGURANÇA SOCIAL. **Aposentadoria**.

INTERNATIONAL LABOUR ORGANIZATION (ILO). **Facts on Social Security**.

INTERNATIONAL SOCIAL SECURITY ASSOCIATION (ISSA). **Demographic changes and social security: Challenges and opportunities** World Social Security Forum. 30th ISSA General Assembly. **Anais...** Cape Town: International Social Security Association, 2010

____. **Ten global challenges for social security**. ISSA. Geneva.

LABOURÉ, M. Pensions: the Impact of Migrations and Cross-Border Workers in a Small Open Economy. **Journal of Pension Economics and Finance**, p. 1–24, 2018.

LACOMBA, J. A.; LAGOS, F. Immigration and Pension Benefits in the Host Country. **Economica**, v. 77, n. 306, p. 283–295, abr. 2010.

LEE, E. S. A Theory of Migration. **Demography**, v. 3, n. 1, p. 47, 1966.

LEWIS, W. A. Economic Development with Unlimited Supplies of Labour. **The Manchester School**, v. 22, n. 2, p. 139–191, maio 1954.

LIDDO, G. DI. Immigration and PAYG pension systems in the presence of increasing life expectancy. **Economics Letters**, v. 162, p. 56–61, jan. 2018.

LIEBMAN, J. B. Redistribution in the current U.S. social security system. *In*: FELDSTEIN, M.; LIEBMAN, J. B. (Eds.). **The Distributional Aspects of Social Security and Social Security Reform**. Cambridge, MA.: University of Chicago Press, 2002. v. Ip. 11–48.

MARTINS, F. & BARBON, J. Lei de Migração: o que muda nas regras para estrangeiros no Brasil. **Folha de São Paulo**, maio 2017.

MASSEY, D. S. *et al.* Theories of International Migration: A Review and Appraisal. **Population and Development Review**, v. 19, n. 3, p. 431, set. 1993.

_____. **Worlds in motion: understanding international migration at the end of the millenium**. Oxford: Clarendon Press, 1998.

MINISTERIO DE EMPLEO Y SEGURIDAD SOCIAL. **Aposentadoria**.

MODIGLIANI, F.; BRUMBERG, R. Utility Analysis and The Consumption Function: An Interpretation of Cross-Section Data. *In*: KURIHARA, K. (Ed.). **PostKeynesian Economics**. New Brunswick: Rutgers University Press, 1954. p. 388–436.

NEYSMITH, S. M.; ARONSON, J. Global aging and comparative research: Pushing theoretical and methodological boundaries. **Journal of Aging Studies**, v. 26, n. 3, p. 227–231, ago. 2012.

PALLARES-MIRALLES, M.; ROMERO, C.; WHITEHOUSE, E. **A Worldwide Overview of Facts and Figures**: Social Protection & Labor Discussion Paper 69724. Washington, D.C: PREVIDÊNCIA SOCIAL. **Acordos Internacionais**.

_____. **APOSENTADORIA: Sancionada fórmula 85/95 para aposentadoria por tempo de contribuição**.

RANIS, G.; FEI, J. C. H. A Theory of Economic Development. **The American Economic Review**, v. LI, p. 533–565, 1961.

RAVENSTEIN, E. G. The laws of migration. **Journal of the Royal Statistical Society**, v. 52, p. 241–305, 1889.

SABATES-WHEELER, R.; KOETTL, J. Social protection for migrants: The challenges of delivery in the context of changing migration flows. **International Social Security Review**,

v. 63, n. 3–4, p. 115–144, jul. 2010.

SANTOS, M. A. DOS *et al.* **Migração: uma revisão sobre algumas das principais teorias.** Texto para discussão 398. Cedeplar/UFMG.

SEVAK, P.; SCHMIDT, L. Immigrants and Retirement Resources. **Social Security Bulletin**, v. 74, n. 1, p. 27–45, 2014.

SJAASTAD, L. A. The costs and returns of human migration. **Journal of Political Economy**, v. 70, n. 5, p. 80–93, 1962.

SKELDON, R. Migration Transitions Revisited: Their Continued Relevance for The Development of Migration Theory. **Population, Space and Place**, v. 18, n. 2, p. 154–166, mar. 2012.

SOCIAL SECURITY ADMINISTRATION (SSA) & INTERNATIONAL SOCIAL SECURITY ASSOCIATION (ISSA). **Social Security Programs Throughout the World: Europe, 2016.** Washington, D.C.

TAMAGNO, E. Coordination of social security programmes of developed and developing countries. **International Social Security Review**, v. 47, n. 1, p. 3–13, jan. 1994.

TAYLOR, J. E. Differential migration, networks, information and risks. *In*: STARK, O. (Ed.). **Research in Human Capital and Development.** Greenwich, CT.: JAI Press, 1986. p. 147–171.

TODARO, M. P. A Model of Labor Migration and Urban Unemployment in Less Developed Countries. **The American Economic Review**, v. 59, n. 1, p. 138–149, 1969.

UNITED NATIONS. **International Migration Report 2015.** New York: [s.n.].

WHITEFORD, P. The use of replacement rates in international comparisons of benefit systems. **International Social Security Review**, v. 48, n. 2, p. 3–30, abr. 1995.