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Working Market for Patients Living with Advanced Breast Cancer in Portugal: Call for Action

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Background & objectives

- Breast cancer is the most common malignancy among women in Portugal and most diagnoses occur in women aged between 20 and 64 years [1]. Metastatic breast cancer (MBC) is incurable, albeit treatable, and is associated with a significant morbidity.
- MBC decreases women’s labour productivity, due to symptoms of the disease, side effects of the treatment and time spared for treatments, exams and consultations. Therefore, studying the impact of MBC on women’s labour market situation is of major economic and social relevance.
- There is little evidence showing that allowing women living with MBC to continue working is beneficial not only to the patient and her family, but also to the society.
- This study aims to quantify the productivity costs of premature abandon of labour market as well as to evaluate possible labour market policies designed to promote employment.
- It also estimated the prevalence of working-aged women with MBC in 2019, in Portugal, since cancer registries do not register relapse and therefore the exact number of patients with MBC is unknown.

Methods and inputs

(i) A **cumulative incidence model** was developed to estimate the prevalence of working-aged women with MBC. The model, that follows a Markov structure, allows to track several cohorts over a time horizon of 10 years (2010-2019). The results are stratified by age and breast cancer stage (I, II, III and IV).

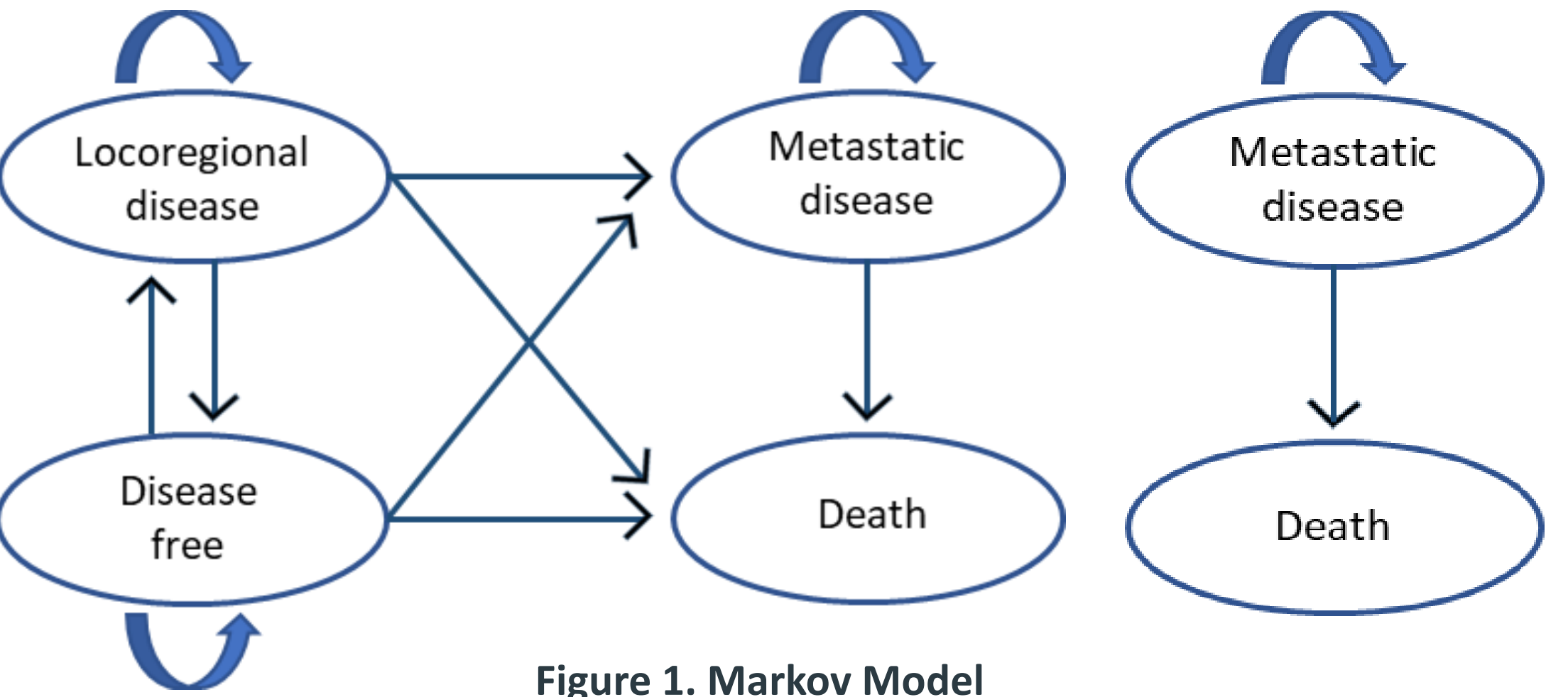


Figure 1. Markov Model

(ii) An **observational study** (survey of 112 patients with MBC) was used to characterize the employment status and working conditions of MBC patients. Its results, together with national sociodemographic data, allowed to estimate the probability of unemployment among MBC patients and their average salaries, by age group.

Table 1. Probability of transition to unemployment and average monthly wage of MBC women.

Age group	Probability of transition to nonemployment	Monthly base wage (€)
20-24	21%	973
25-29	33%	1,089
30-34	37%	1,070
35-39	38%	1,046
40-44	40%	1,020
45-49	44%	971
50-54	45%	908
55-59	41%	879
60-64	29%	877
65+	31%	857

Incidence: Portuguese BC incidence data exists for the years 2010, 2018 and 2019 [1-3]. Based on these data, incidence *per* age group was estimated for the years 2011-2017, through linear regression.

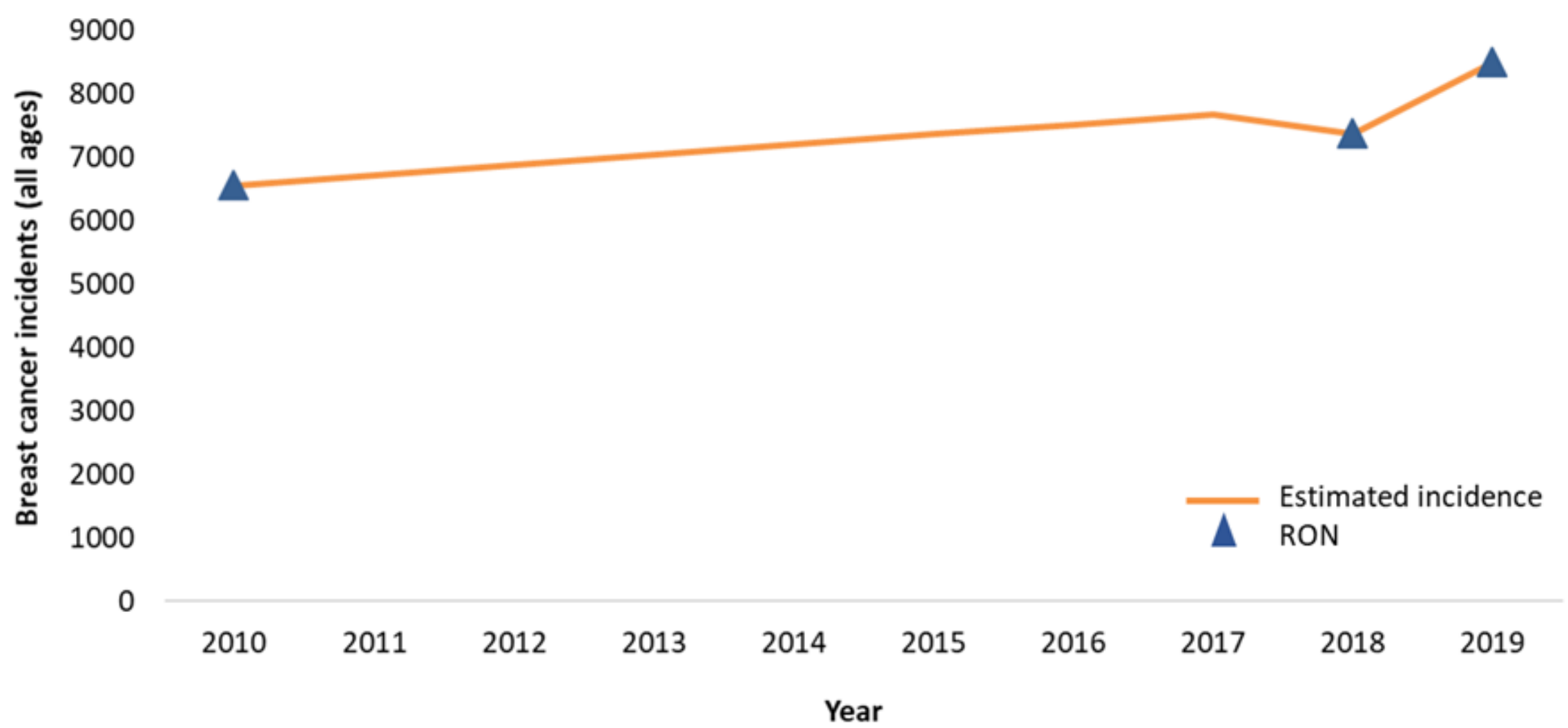


Figure 2. Female breast cancer incidence (2010-2019)

Survival: annual death probabilities, by disease stage at diagnosis, were estimated based on the BC Kaplan-Meier (KM) survival curves reported by André *et al.* (2014).

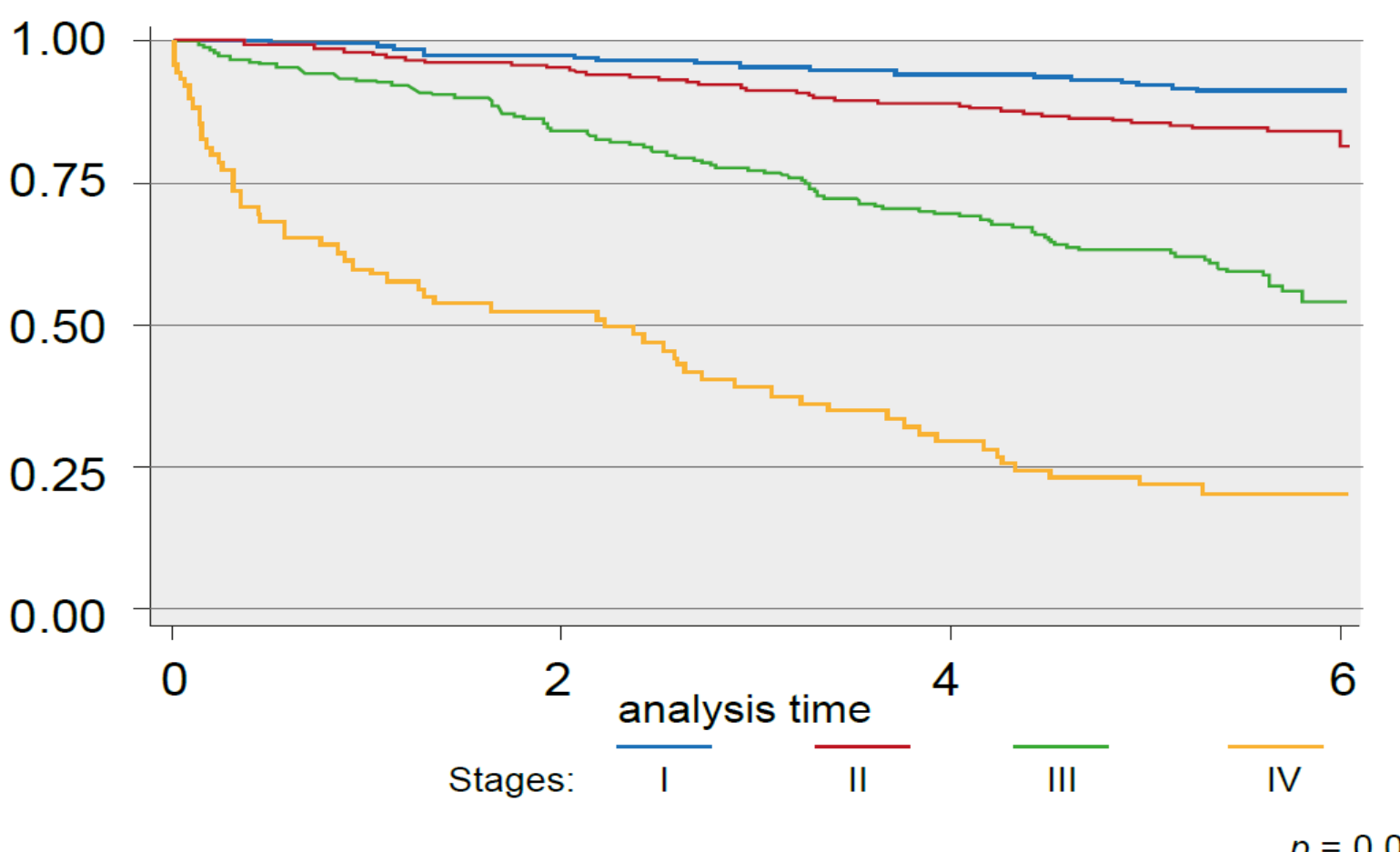


Figure 3. BC survival by stage at diagnoses, Kaplan-Meier [4]

Distribution by breast cancer stage: evidence from André *et al.* (2014) was used to inform the distribution of patients by disease stage, at diagnosis.

Table 2. Distribution of new BC diagnosis by stage.

BC Stage	I	II	III	IV
Proportion	35.7%	39.1%	18.6%	6.6%

Recurrence probabilities: based on literature [5-6], probabilities of locoregional and distant recurrences were estimated, by disease stage at diagnosis and year since diagnosis.

Table 3. Probability of locoregional and distance recurrence.

Type of recurrence	Staging classification at diagnosis	Years since diagnosis								
		1	2	3	4	5	6	7	8	9
Locoregional	I	0.0%	0.3%	0.6%	0.3%	0.3%	0.1%	0.2%	0.2%	0.0%
	II	0.5%	1.0%	1.0%	0.9%	0.7%	0.5%	0.5%	0.3%	0.3%
	III	2.3%	2.8%	2.2%	1.1%	1.0%	0.7%	0.8%	0.2%	0.0%
Distance	I	0.1%	0.7%	1.5%	0.8%	0.7%	0.4%	0.4%	0.5%	0.0%
	II	1.4%	2.7%	2.7%	2.5%	1.7%	1.5%	1.2%	0.7%	0.8%
	III	6.1%	7.4%	5.7%	2.8%	2.7%	2.0%	2.0%	0.6%	0.0%

Results

- Based on the Markov model described, the number of BC survivors in 2019, and their distribution by disease stage was estimated (Table 4).

Table 4. Estimated prevalence of women with breast cancer in Portugal, 2019.

Disease Stage	Number of women	
	All ages	Working-aged women
Locoregional disease or BC free	55,748	31,037
Metastatic disease	4,176	2,151

1. Base Case Scenario

- Between 2019 and 2021, for the cohort of working-aged women with MBC in 2019, the total productivity cost due to MBC amounts to 28.676.754 € (Table 5).
- Government transfers, totaled 3,468,866 €, over the period 2019-2021 (Table 6).

Table 5. Cost of nonemployment due to metastatic breast cancer – Base Case Scenario.

Years	2019	2020	2021	Total
Foregone women's earnings	10,750,468€	7,372,075€	5,050,591€	23,173,134€
Foregone employers' contribution to Social Security	2,553,236€	1,750,868€	1,199,515€	5,503,619€
				28,676,754€

Table 6. Government transfers due to metastatic breast cancer – Base Case Scenario.

Years	2019	2020	2021	Total
Disability pension	1,557,568€	1,083,078 €	752,321€	3,392,967€
Unemployment subsidies	53,723€	22,176 €	-	75,899€
				3,468,866€

The costs associated to the transition of working-aged women to nonemployment due to MBC were estimated as:

- Productivity Costs:** foregone earnings, which can be decomposed into **foregone MBC patients’ earnings** and **foregone employers’ contributions to Social Security**.
- Government Transfers:** in the form of **disability pensions** and **unemployment subsidies**, which are an income redistribution mechanism, however their quantification is relevant as part of the government budget balance.
- This study considered two scenarios:
 - Base case scenario** – that observed with the current labour market policies.
 - Alternative scenario** – that evaluates the impact of a subsidized part-time employment regime, in which women with MBC would be given the possibility to work 20 hours a week but earn the full-time equivalent wage, with 50% of the wage paid by the employer and 50% by the government.

2. Alternative Scenario

- In the alternative scenario, the productivity costs due to MBC would correspond to 50% of the productivity costs registered in the base case (Table 7).
- The estimated government transfers would totalize 15,419,914 €, between 2019 and 2021.

Table 7. Cost of nonemployment due to metastatic breast cancer – Alternative Scenario.

Years	2019	2020	2021	Total
Foregone women's earnings	5,375,234€	3,686,038€	2,525,296€	11,586,567€
Foregone employers' contribution to Social Security	1,276,618€	875,434€	599,758€	2,751,810€
				14,338,377€

Table 8. Government transfers due to metastatic breast cancer – Alternative Scenario.

Years	2019	2020	2021	Total
Subsidized wage	5,787,132€	3,962,659€	2,710,746€	12,460,537€
Subsidized contribution to Social Security	1,374,444€	941,132€	643,802€	2,959,377€
				15,419,914€

Table 9. Productivity costs and government transfers due to metastatic breast cancer in 2019-2021 in the Alternative Scenario vs. Base Case Scenario.

	Alternative Scenario	Base Case Scenario	Difference
Productivity costs	14,338,377€	28,676,754 €	- 14,338,377 €
Government transfers	15,419,914 €	3,468,866 €	11,951,048 €

Conclusions

- It was estimated that 2,151 working-aged women were living with MBC in 2019, in Portugal. 38.60% of those were in a situation of nonemployment (unemployment or early retirement) due to the disease.
- This study evaluates the impact of a subsidized part-time employment regime designed to foster MBC women’s continued participation in the labour market.
- In this alternative scenario, productivity costs due to the disease would be halved and government funds allocated to working-aged MBC women would increase by 11,951,048€.
- The increase in government transfers would be outweighed by a 14,338,377€ decrease in productivity costs.
- Such results call for changes in labour market laws to enable patients living with metastatic cancers the right to choose flexible working hours, without depending on the employer permission, as currently stated in the Portuguese law.

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