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Employment, job skills and occupational mobility of cancer survivors

Eskil Heinesen[a,*], Susumu Imai[b,c], Shiko Maruyama[c]

[a] Rockwool Foundation Research Unit, Sølvgade 10, 1307 Copenhagen K, Denmark
[b] Hokkaido University, Kita 9 Nishi 7, Kita-ku, Sapporo, Hokkaido 060-0809, Japan
[c] University of Technology Sydney, PO Box 123, Broadway, NSW 2007, Australia

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ABSTRACT

Previous studies find significant negative effects of cancer on employment, with stronger effects for less-educated workers. We investigate whether the effect of cancer varies by skill requirement in the pre-cancer occupation, whether such heterogeneity can explain educational gradients, and whether cancer is associated with changes in job characteristics for cancer survivors who remain employed four years after the diagnosis. We combine Danish administrative registers with detailed skill requirement data and use individuals without cancer as a control group. Our main findings are the following: the negative effect of cancer on employment is stronger if the pre-cancer occupation requires high levels of manual skills or low levels of cognitive skills; the educational gradient diminishes substantially if we allow the effects of cancer to also depend on pre-cancer skill requirements; and cancer is not associated with occupational mobility, indicating potential for policies that reduce labour market frictions for cancer survivors.

1. Introduction

Each year many people of working age are diagnosed with cancer and survival has increased considerably due to screening programmes and improved treatments (Cutler, 2008). Labour market outcomes for cancer survivors are therefore important for society. Cancer is a serious health shock, and it is liable to exert important effects on various economic outcomes (e.g., Lee and Kim, 2008; García-Gómez et al., 2013; Lundborg et al., 2015). Previous studies have found that cancer has significant negative effects on labour market participation, although the majority of cancer survivors return to work (Bradley et al., 2002a,b, 2005, 2007; Steiner et al., 2004; Moran et al., 2011; Short et al., 2008; Datta Gupta et al., 2011; Heinesen and Kolodziejczyk, 2013; Candon, 2015).

Information about which groups of cancer patients are at greater risk of leaving the labour force is important in designing effective labour market policies for cancer survivors. Some dimensions of heterogeneity in the effects of cancer have already been studied in the literature. Bradley et al. (2007) found that the adverse effect of cancer on the labour supply of married females in the US is larger for women who have health insurance through their spouse's employer than for women who have it through their own employer. Comparison of the results in Short et al. (2008) and Moran et al. (2011) indicates that the effect of cancer on the probability of working is similar for workers above and below 55 years of age. The effect of cancer is greater where the cancer is found to have metastasized at diagnosis (Thielen et al., 2015) and with recurrence/further cancers (Heinesen and Kolodziejczyk, 2013). Heinesen and Kolodziejczyk (2013) found significantly larger effects of breast and colorectal cancer on labour market participation for workers with less education than for better-educated workers. They also found significantly larger effects for blue-collar workers than for white-collar workers, although the sample size involved was too small for investigation of the combination of educational and blue-collar/white-collar gradients and their underlying mechanisms. The binary blue-collar/white-collar distinction may also be too coarse to provide useful policy implications.

* Corresponding author at: Rockwool Foundation Research Unit, Sølvgade 10, DK-1307 Copenhagen K, Denmark.
E-mail address: esh@rff.dk (E. Heinesen).

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In this paper, we utilise detailed data on job characteristics to investigate heterogeneity in the effect of cancer on labour market outcomes. Our variables describing job characteristics measure skill and ability requirements in each specific occupation. We construct these variables using the American Occupational Information Network (O*NET) database. The O*NET database and its earlier version, the Dictionary of Occupational Titles, have been used in empirical research into various topics: returns to skills (Ingram and Neumann, 2006; Bacolod and Blum, 2010; Yamaguchi, 2012); the association between wage losses and the extent of skill switching for displaced workers (Poletaev and Robinson, 2000); skills characteristics of immigrants' jobs compared to natives' jobs (Ottaviano et al., 2013; Imai et al., 2014); and the effect of immigration on job skill characteristics of native workers (Foged and Peri, 2016). We are not aware that these data have been used in analyses of the effect of cancer or other health shocks.

We combine detailed O*NET job characteristics data with a large longitudinal dataset of cancer survivors and matched control groups drawn from Danish administrative registers. This allows control for a large number of important baseline characteristics, including health indicators and previous labour market outcomes. We study labour market outcomes four years after the diagnosis of cancer, focusing on workers who were employed at baseline (two years before the diagnosis) and who survived for five years after the diagnosis. We consider all types of cancers (except skin cancer); many earlier studies looked only at the effects of specific cancer (e.g., breast or colorectal cancer).

In particular, we study three new questions. First, we investigate whether the effect of cancer varies with baseline job characteristics. We investigate several aspects of skill requirements of the pre-cancer job, focussing in particular on the hypothesis that the effect of cancer on employment is greater where the pre-cancer job involved high physical and manual demands, because cancer and its treatment may reduce physical strength, and previous studies indicate that cancer survivors are less likely to return to work if they had physically demanding jobs at baseline (see the survey in Spelten et al., 2002). Second, we investigate whether the educational gradient in the effect of cancer on employment is due to differences in occupation or some other reason (e.g., lifestyle and health knowledge) by allowing the effect of cancer to depend on both pre-cancer job characteristics and education levels. Third, we study whether cancer affects the overall probability of switching occupation, workplace or industry, and whether cancer affects job characteristics for those who remain employed after cancer.[1] One may expect, on the one hand, that reduced ability to work due to cancer not only reduces labour market participation but also increases mobility towards less demanding jobs (including jobs requiring less physical strength). On the other hand, even if there is a need for cancer survivors to move to less demanding jobs, this may be difficult in practice due to labour market frictions. Moving to another employer and finding a new job may be particularly difficult after a long period of absence due to a serious illness such as cancer. Information about whether workers with reduced ability to work can readjust their work situation has important policy implications, in view of the large social cost of workers leaving the labour force, possibly to receive disability pensions.

Our results can be summarised as follows. For both genders, cancer reduces the probability of being employed in the fourth year after diagnosis by about 7 percentage points, relative to the non-cancer group. Cancer also leads to an increase in the probability of receiving disability pension (which implies that the person has left the labour force permanently) by 5–6 percentage points. Earnings fall by about 10% because of cancer (not conditioned on being employed after cancer), and before-tax gross income falls by about 3%. We also find significant educational gradients in the effect of cancer on employment status. These results are consistent with earlier studies.

We also find significant gradients in the effect of cancer according to baseline job characteristics. An increase in cognitive (analytical and interpersonal) job skill requirements by 1 standard deviation reduces the negative effect of cancer on employment by about 2 percentage points for males and 1 percentage point for females. An increase in manual skill requirements (physical strength and fine motor skills) by 1 standard deviation increases the negative effect of cancer on employment by about 1.4 percentage points for females, but for males no statistically significant gradient is found. Gradients in cognitive and manual skill requirements in the effect of cancer are statistically significant for both males and females when the outcome is the probability of receiving a disability pension, however. For earnings and income, we find no statistically significant gradients in relation to skill requirements or education. When the effects of cancer are taken to depend on both baseline skill requirements and education, estimates of educational gradients are reduced considerably, especially for females. Consequently, pre-cancer job characteristics are important in explaining why the effect of cancer on labour market outcomes is larger for the low-educated than for the high-educated. This finding probably reflects the fact that low-educated persons must accept jobs characterised by high requirements of physical strength (and low requirements of analytical and other cognitive skills), and that cancer and its treatment often reduce physical strength in particular.

We find no effect of cancer on the probability of moving to a different occupation, plant or industry after cancer (conditional on remaining employed). We also find no effect of cancer on job characteristics (for those who remain employed), which implies that cancer survivors do not switch to less demanding occupations any more than the control group. This is an unexpected result because for many people cancer reduces skills and ability to work. A possible explanation is that some cancer survivors could have tried unsuccessfully to switch to a less demanding occupation. The results therefore indicate very limited opportunities in the labour market for occupational adjustment after a health shock, and thus a potential for policies that enhance labour market mobility of cancer survivors, so as to alleviate the negative effect of cancer on labour-market participation.

Finally, we show that our main regression estimates of the effects of cancer are very similar to treatment effect estimates obtained by using inverse probability weighting, and we address the plausibility of the unconfoundedness assumption in three supplementary analyses. These are: using later cancer patients as an alternative control group; using difference-in-differences; and estimating the effect of cancer on lagged outcomes (falsification test).

2. Empirical methods

We use a dataset of cancer survivors, and a control group of workers without cancer, to estimate the effects of being a cancer survivor on labour market outcomes four years after the year of diagnosis. We pool observations on cancer patients from several base years (years of diagnosis) and select a matched control group for each base year. Let t denote the base year (which is constant over time for a given individual) and consider a model for the outcome four years after the base year, as follows:

$$Y_{i,t+4} = \beta_0 + \beta_1 C_i + \beta_2 C_i X_{i,t-2} + \beta_3 A_{it} + \beta_4 Z_{i,t-2} + \varepsilon_{i,t+4}, \quad (1)$$

where $Y_{i,t+4}$ is the outcome of individual i in calendar year t+4 (four years after the base year), C_i is a dummy variable which is unity

[1] This part of the analysis is related to van de Mheen et al. (1999) who find no significant association between ill health conditions and subsequent upward or downward occupational mobility based on eight ordered occupational classes.