

Intention to Re-enter the Labour Force among Older Male Singaporeans: Does Health Status Matter?

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Abstract The increasing old-age dependency ratio in Singapore poses a major challenge to the social security benefit for its ageing population. Providing older Singaporeans with more employment opportunities may then benefit individuals, families, and society—if older adults are willing and able to work. This paper investigates the intention of Singaporean male retirees to re-enter the workforce and how their health status may influence this decision. Using data from the Social Isolation, Health and Lifestyles Survey (2009) we model the intention to re-enter as the dependent variable and used both subjective and objective health measures as the main independent variables. A probit model accounting for sample selection was estimated. We found that poorer health status had a positive association with the probability of elderly men reporting having retired, and a negative association with the intention to re-enter the labour force. Health status may matter substantially in older adults' labour market transitions, especially for occupations requiring physical labour. Perceived income adequacy in old age was also a contributing factor in the retiree intention to re-enter the labour force. These results suggested that poor health can be a substantial deterrent to older workers' labour force participation through earlier retirement and lower likelihood of re-entering the labour force; investing in the health of older and middle-aged workers may have positive long-term economic effects.

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Introduction

In the 1990s, interest in understanding the relevant mechanisms operating in the relationship between health and economy started to gather attention (Barro 1996). Early studies have suggested considerable evidence supporting the association of a nation's overall health status with its eventual economic growth (Barro 1996; Bloom et al. 2001, 2009). In fact, the positive effect of health on national growth is widely acknowledged across the sphere of international development (Bloom and Canning 2000, 2005; Barro 1996; Bhargava et al. 2001; Bloom et al. 2001; Weil 2007), both at the micro- and macroeconomic levels (Bloom and Canning 2005). Today, against the backdrop of ageing populations, the impact of health on economic development re-emerges as a critical issue. Along these lines, the role of health status in labour force participation among the elderly remains an equivocal subject.

Health status is highly dependent on an individual's prior investment in health early in his life. Nevertheless, two opposing scenarios may be considered in understanding the role of health status in the intention to re-enter the labour force. Firstly, the health status of an individual may be a positive predictor for labour force participation such that an older person in good physical and cognitive health can choose to work longer years and, if retired, decide to re-enter the workforce. Within the same context, older adults in poor health—presumably because of their low investment in health in their youth—may accumulate health issues and, expectedly, health shocks that can lead to an immediate, if not premature, exit from the labour market upon reaching the minimum retirement age. In addition, the marginal disutility of labour may increase with poor health (Bazzoli 1985), given that individuals may increasingly feel less happy for having to work an additional hour when they are frail and unwell. Conversely, older adults in better health may have a greater marginal utility of leisure such that having good health becomes a negative predictor of labour force participation, as individuals choose to give up work as soon as they can in order to enjoy more time off. Individuals with poor health, on the other hand, may choose to work beyond retirement to earn the money necessary to pay off medical expenses incurred while still at work and, perhaps, be able to save more for future medical expenses. These conflicting scenarios illustrate the ambiguity in the effect of health status on older adults' retirement and re-entry to the labour force, thus offering an interesting empirical research question.

Understanding the role of older adults' health status in their decision to re-enter the labour force and their income-earning capacity remains critical, given the increasing proportion of the elderly population in Singapore. The minimum-age-based entitlements of the Central Provident Fund (CPF)—the main vehicle of Singapore's social protection system—highlights the government's emphasis on personal and family responsibility in addressing long-term illnesses and providing for health needs in old age (Asher and Rajan 2000). Defined contribution pensions, even for full-career workers, are projected to replace just 17 % of net lifetime average earnings in Singapore (Ng 2011). Thus the elderly with a shorter period of employment over their lifetime will have inadequate retirement income from CPF. Although the government

has made efforts to address these concerns through its Retirement and Re-employment Act, which mandates employers to provide continued employment opportunities for healthy individuals reaching the minimum retirement age (Retirement and Re-employment Act 2013), this act does not clearly consider in its provisions the retirees, older workers in poor health, the self-employed, and those who have never worked (i.e., elderly homemakers).

This empirical paper aims to determine whether—and to what extent—health status plays a role in the intention of older Singaporean men to re-enter the workforce after retirement. Retirees who are likely to re-enter the labour force can potentially increase labour supply. However, as much as economic variables are known to influence retirement decisions, employee health status may also play an important role. Towards providing better insight on the study framework, an overview of Singapore's labour market setting and the existing literature on health and employment among older adults are presented within this context.

Singapore's Labour Market

Singapore is faced with the enormous challenge of a rapidly ageing labour force. In 2012, 67 % of Singapore's 3.8 million resident population (i.e., permanent residents and citizens) belonged to the 20–64 years working age group, with the elderly (aged ≥ 65 years) comprising approximately 10 % of the total population (Key Demographic Indicators 1970–2012 2012). The proportion of the elderly may be expected to increase given the increasing trends in life expectancies at birth and at 65 years of age, which are currently at 82 and 20 years respectively. Its current total fertility rate remains below replacement levels at 1.2 per female (Key Demographic Indicators 1970–2012 2012). According to population estimates and projections conducted by the economic and social affairs unit of the United Nations, the Singaporean elderly will constitute approximately 22 % of its projected 6 million total population by 2030 (Probabilistic Population Projections 2012). Inevitably, these demographic shifts are accompanied by changes in the composition of labour supply available and a consequent increase in social security needs.

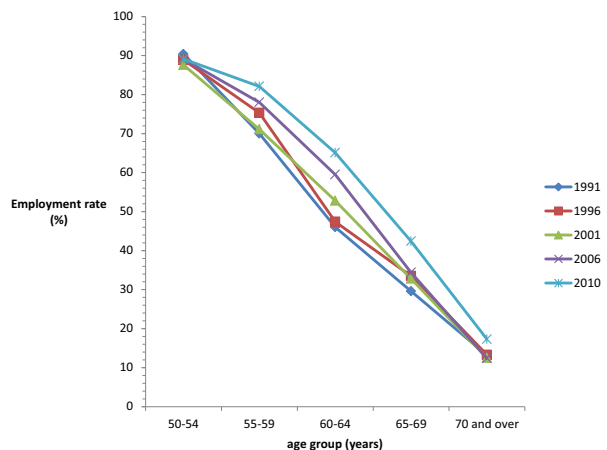
Population and labor supply experts have described this characteristic period where a decline in both mortality and fertility is observed as an opportunity for accelerated economic growth (Bloom and Canning 2000; Bloom et al. 2009; Gribble and Bremner 2012). Bloom and Canning (2000) reported evidence of the positive impact of an increasingly elderly population on economic growth (i.e., largely through continued savings and labour force participation among the elderly and the accompanying skills and knowledge transfer), provided a country is able to take advantage of this episode (Gribble and Bremner 2012). However, this demographic dividend is a window unlikely to remain perpetually open (Bloom and Canning 2000); critical planning is necessary as a country moves away from this period.

As seen in many developed economies, an ageing workforce is expected to persist amid a continuously ageing population. With a 20-year life expectancy at age 65, Singapore's current old-age support ratio of seven working-age persons (aged 20–64 years) supporting one elderly individual (aged 65 years and older) (Key Demographic Indicators 1970–2012 2012) is very likely to decrease in the coming

years. In 2011, despite the high economic activity rate among Singaporeans, labour force participation begins a steady decline at the 45–49 years age group, with the labour force participation rate declining to 54.7 % in the 60–64 years age group (Singapore Department of Statistics: Labour, Employment, Wages and Productivity–Age-Sex Specific Labor Force Participation Rates 2011). The Retirement and Re-employment Act of 2012 is seen as an important component in the government’s response to address these concerns; its predecessor, the Retirement Age Act, decreed 62 years as the legal retirement age in Singapore (Retirement and Re-employment Act 2013). Even though the Retirement and Re-employment Act maintains the minimum retirement age at 62, it now enforces an additional requirement for all employers “to offer re-employment to eligible employees who turn 62, until they are 65 years old” (Retirement and Re-employment Act 2013). Such a policy signals a growing support for encouraging labour force participation among older workers. However, the health status of older adult workers is a key factor that could hinder labour force participation. Furthermore, the act specifies strict criteria for re-employment, emphasizing that an eligible individual must be a current employee with a satisfactory job performance in the past 2–3 years of employment prior to turning 62. Being medically fit to continue working is another important requisite. Thus, although companies from both the public and private sectors may readily demonstrate a willingness to extend an older adult’s employment period, eventual re-employment still remains conditional on individual job performance and health status. These requirements raise the relevant question of whether health, being an age-related factor, plays a substantial role in the labour supply decision of older Singaporeans.

Over the past two decades, age-specific labour supply patterns among older male Singaporeans have consistently shown employment rates declining with age, from a high of approximately 90 % in the 50–54 years age group to an average of 14 % in the above-70 age group (Fig. 1). Using employment rates as a measure of labour supply does not provide detailed information on leaving and re-entering the workforce; nevertheless, the overall patterns provide useful insight on the economic activity within the age group of older adults. In the 1990s, a steep decline in employment rates was largely seen in the 60–64 age group, whereas trends over the more recent years showed

Fig. 1 Older male employment rate, by age group 1991–2010 (Report on labour force in Singapore 2010). Source: Ministry of Manpower Labour Force Survey, 2010



the sharp decrease in employment rates shifting to the above-70 age group (23.5 percentage points on average). The greatest decline in the percentage of employed older adults was observed in 1996 with employment rates in the 55–59 and the 60–64 age groups showing a 28-percentage-point difference. These labour market trends illustrate a changing paradigm in population ageing and labour force participation. Although labour force participation was shown to decrease with age as expected, the proportion of the elderly who continue to work past the statutory retirement age have considerably increased over the years, with employment rates in the above-70 age group reaching a high of 17.3 % in 2010.

Literature Review

In attempting to further understand the role of health status in older male adults' intention to re-enter the workforce after retirement, it may be useful to consider from a wider perspective, other factors encompassing labour force participation among the elderly. The relevant literature on the dynamics of labour force participation in older adults may be divided into two major subthemes: (1) retirement, and (2) post-retirement re-entry into the workforce.

Health and Labour Force Participation in Older Adults

An individual's health status is an important consideration in reaching a retirement decision. Several studies have investigated the role of health in labour market outcomes and provided key findings on the impact of health on retirement (Kerkhofs et al. 1999; Jimenez-Martin et al. 2000; Coile 2004; McGarry 2004; Disney et al. 2006; Hagan et al. 2006; Datta Gupta and Larsen 2007; Zucchelli et al. 2007; Johnson et al. 2008; Drydakis 2009; Van Houtven and Coe 2010). Some of the health-related measures considered to evaluate the impact of health on retirement include: out-of-pocket medical expenses (Johnson et al. 2008); overall self-reported health status (Anderson and Burkhauser 1985); presence of health impairments and work limitations combined with objective health measures (Dwyer and Mitchell 1998; Drydakis 2009; Kerkhofs et al. 1999); as well as individual and spousal health shocks based on responses to standardized questionnaires (Coile 2004; Van Houtven and Coe 2010) and records of hospitalization due to specific types of health shocks (Datta Gupta and Larsen 2007). Most previous studies acknowledged the challenge in determining the effects of health on retirement, citing the lack of a directly observable measure for health status (Dwyer and Mitchell 1998) and the potential for reverse causality (Disney et al. 2006) and justification bias (Dwyer and Mitchell 1998) in self-reported measures as the major limiting factors. The impact of pension incentive schemes enforced through social security regulations (Gruber and Wise 1999a, b; Kerkhofs et al. 1999) have been considered in health and retirement studies; but health issues influence the age at which an employee chooses to retire regardless of the effect of pension schemes. Broadly, the current literature describes the direct effects of individual and spousal health (e.g., general poor health, acute health events, health problems and limitations) (Datta Gupta and Larsen 2009; Disney et al. 2006; Dwyer and Mitchell 1998; Jimenez-Martin et al. 2000; Zucchelli et al. 2007), as well as the indirect effects of health on retirement where

health status has an intermediary influence on another health-related determinant (e.g., life expectancy, out-of-pocket medical expenses) (Grossman 2000; Johnson et al. 2008). The intention to retire was reported to be more strongly influenced by ill health (Jimenez-Martin et al. 2000) than other economic factors (Dwyer and Mitchell 1998). In fact, among individuals aged 50 years and older, health shocks serve as a positive predictor of an individual's decision to retire (Disney et al. 2006; Zucchelli et al. 2007). A study among elderly male workers in Denmark showed that despite implementing welfare programs that provide assistance to older workers, health shocks still resulted in an 8 % increase in the probability of retirement (Datta Gupta and Larsen 2007). On the other hand, individuals expecting greater out-of-pocket spending on medical care as adults have been shown to delay their retirement (Johnson et al. 2008), most likely to keep earning for their current and future medical care expenses. Quite expectedly, among husbands and wives, the effect of a husband's health shocks was found to have a stronger impact on a couple's joint decision to retire (Jimenez-Martin et al. 2000); however, besides health status, other individual characteristics have no significant impact on a husband's and wife's retirement choices (Zucchelli et al. 2007). Aside from more directly affecting individual and joint retirement decisions, health status may also influence labour force participation through its effect on life expectancy. If health is positively correlated with longevity, the prospects of living longer with better health may compel people to work longer years to increase their life savings (Bloom and Canning 2000), thus, delaying retirement. Health status can also impact retirement decisions through its dynamics with the basic nature of work and other environmental factors in the work setting (Machado and Portela 2012; Lee and Lee 2011; McPhedran 2012). Doing manual labour, for example, may be a positive predictor of an early exit from the workforce with the physical demands of the job exacting more stress on an individual's health (Gueorguieva et al. 2009). Although the effect of retirement on health presents a reversed framework, and will not be detailed in this study, it is still worth noting that for individuals with poor health—whether because of their job or other factors—retirement may be perceived as a way towards improving their health (Westerlund et al. 2009). In such cases, retirement becomes their way out not only from the workforce but from their health problems as well, suggesting the importance of improving the working environment of older workers to support their health and job satisfaction (Westerlund et al. 2009), which ultimately affects their decision to keep working or perhaps even re-enter the workforce.

Re-entry into the Labour Force

The literature on the re-entry of older employees into the workforce may be distinguished according to the type of labour force transition, that is, whether the older employee re-entering the workforce is coming from an involuntary job loss (Chan and Stevens 2001) or retirement (Blau 1994). However, this distinction is often blurred, since retirement in some cases might be due to involuntary job loss. The current study focuses on the relevant literature on re-entry from retirement transitions, also known as “unretirement” (Maestas 2010). Maestas (2010) found that unretirement was prevalent and even anticipated among retirees, highlighting the importance of recognizing complex retirement process. One of the early works describing the dynamics of labour force participation among older men focused on transitions of retirement-age men

(55–73 years old) between any of the labour force states (i.e., full-time and part-time employment, and out of workforce) (Blau 1994). Although the author did not distinguish between out of labour force status due to involuntary job loss and retirement, the hazard rate for re-entering the labour force as full-time workers was shown to decrease with age, peaking at 5 % among 56-year-olds and falling below 1 % at age 64. Health was identified as one of the factors that consistently impact these transitions; in addition, the duration of being out of workforce also plays a role in re-entry, with those who have been out of workforce for a longer period being less likely to re-enter (Blau 1994). Another US study that examined labour supply trends among older career men using data from the Health and Retirement Study, found that 15 % of American retirees re-enter the workforce after their initial exit (Giandrea et al. 2010). More importantly, the study determined the common determinants of re-entry among this group of older workers. Besides being younger and having a structured pension scheme, older workers with better health were reported to have a higher likelihood of re-entry (Giandrea et al. 2010).

Reviewing the current literature on the role of health in elderly people's retirement and re-entry decisions, allows the opportunity to identify research gaps, particularly relevant to ageing economies like Singapore. Against the background and objectives of this study, this paper examines how health influences an individual's decision to work beyond retirement age; specifically, re-entering the labour force after retirement. Although re-entry to the labor market among retirees may arise as a result of financial shocks related to worsened health status, this effect is likely to be compromised by the countervailing effect that poor health lowers the likelihood of labour force participation. Furthermore, the literature suggests that unretirement is common and often anticipated, not necessarily precipitated by financial shocks and poor retirement planning (Maestas 2010), thus supporting the dominant positive effect of health in labour force participation. We therefore hypothesised that poorer health reduces the likelihood of re-entry to the labour force among retirees.

Aside from raising relevant policy implications for the ageing Singapore workforce and the income security of older individuals, this study uniquely contributes to the literature by focusing on information on older men's intention to re-enter the workforce among retirees and examining both subjective and objective health measures in its empirical model.

Methods

Model

Retiree intention to re-enter the labour force can be expressed using the following model:

$$Reenter^* = \beta_{H_Reenter} Health + \mathbf{X}\gamma + \varepsilon_1 \quad (1)$$

where $Reenter^*$ is a latent variable capturing the retiree's propensity to work again as a function of $Health$ and a vector of other explanatory variables, \mathbf{X} . $\beta_{H_Reenter}$ and γ refer to the coefficient estimate(s) of $Health$ and \mathbf{X} , respectively; and ε_1 is the error term.

As $Reenter^*$ cannot be directly observed, a dichotomous variable, $Reenter$, which indicates whether a respondent intends to work again was defined as follows:

$$Reenter^* = \begin{cases} 1 & \text{if } Reenter^* \geq 0 \\ 0 & \text{if } Reenter^* < 0 \end{cases}$$

However, $Reenter$ is only considered for respondents who have retired. This selection process can then be modeled as follows:

$$\begin{aligned} Retire^* &= \beta_{H_Retire} Health + \mathbf{X}\delta + \varepsilon_2 \\ Retire &= \begin{cases} 1 & \text{if } Retire^* \geq 0 \\ 0 & \text{if } Retire^* < 0 \end{cases} \end{aligned} \quad (2)$$

where $Retire^*$ is a latent variable measuring the propensity of having exited the labour force and $Retire$ is a dichotomous variable indicating whether the individual has retired. $Health$ and \mathbf{X} are the same variables as in Eq. 2, and ε_2 is the error term in Eq. 2.

Ignoring the correlation between ε_1 and ε_2 can lead to inconsistent estimates of the coefficients; to address the potential issue of sample selection, we used the probit model with sample selection (van de Ven and Van Praag 1981), which simultaneously estimates the main probit model of the retiree intention to re-enter the labour force and the selection model of having retired. The `heckprob` command in Stata was used (StataCorp LP, College Station, Texas, USA). A statistical test of the correlation coefficient (ρ) can be used to test for sample selection bias. A $p < 0.05$ cutoff was used to determine the statistical significance for all analyses.

Data and Variables

To carry out this estimation, we used data from the first wave (year 2009) of the Singapore Social Isolation, Health and Lifestyles Survey (SIHLS). The cross-sectional data cover individuals in Singapore aged between 60 and 101 years. The SIHLS includes information on older adults' labour market status, subjective and objective measures of their physical and mental health profile, as well as the different types of interactions between their health status, family income, co-residence, and social engagement. Although well-designed longitudinal data with rich information on health and labour market outcomes would be ideal for this study, there was no such data available at the time of the current study.

Our model focused on older men, because Singaporean men have higher rates of lifetime labour force participation than Singaporean women (Singapore Department of Statistics 2011). As such, our initial sample consisted of older men aged 60–80 years with variation in labour market status. The possible labour market states were full-time work, part-time work, retirement, and home-making. After excluding a small number of observations with missing values for any of the study variables, the full sample included 1,745 observations.

The main dependent variable was specified as the male retiree's intention to re-enter the labour force. This specification was based on two consecutive questions in the

survey. The first question, “*Are you currently working?*” had four possible responses namely, “*yes, full-time work*”, “*yes, part-time work*”, “*no, retired*”, and “*no, homemaker*”. Participants who replied “*no, retired*” were asked the follow-up question, “*Would you like to be working?*” with two possible responses, “*yes*” or “*no*”.

The regressors used in our estimation included subjective and objective health measures, employment history, educational attainment, sources of income in old age, perceived income adequacy and demographics. A five-category ordinal variable of overall self-rated health (i.e., Very healthy, Healthy, Of average health, Unhealthy, Very unhealthy) served as a subjective health measure. To help assess the self-reported health measure, the number of respondent difficulties with physical ability and agility was used as an additional measure. This objective health measure was based on the number of items considered “*difficult*” to perform out of the following 10 items related to physical ability and agility (Nagi 1976): (1) walk 200 to 300 m (1 bus stop to another); (2) climb 10 steps without resting; (3) stand (go without sitting) for 2 h; (4) continue to sit for 2 h; (5) stoop or bend your knees; (6) raise your hands above your head; (7) extend arms out in front of you as if to shake hands; (8) grasp with your fingers or move your fingers easily; (9) lift an object weighing approximately 10 kg (a big-sized bag of rice); and (10) lift an object weighing approximately 5 kg (a middle-sized bag of rice). Depending on the distribution, four categories were created for the number of items on physical ability and agility checked ‘difficult’ (0; 1; 2–3; and 4+).

Descriptive Statistics

Summary statistics of the main variables and covariates define the overall distribution of participants in the total sample and the retiree sample (Table 1). Among retirees ($N=1082$), 16.6 % reported their intention to re-enter the labour force. In terms of health status, poorer average self-reported health was observed among older men in the retiree sample. Although the majority of respondents reported being of average health, 16.5 % of retirees responded they were “Unhealthy” as opposed to only 12.4 % in the total sample. Similarly, a greater percentage of retirees (vs. the total sample) reported having difficulty in performing the items on the list of activities measuring physical ability and agility. Only 74.5 % of retirees had no difficulty (0/10) compared with 80.3 % in the total sample; roughly, 6 % of retirees had difficulties in at least four of the items (vs. 4.2 % in the total sample). On average, the respondents in the retiree sample were approximately aged 70.8 years, slightly older than the average age of the total sample (69.2 years). The majority of older men in both samples (44.6 and 47 %) completed at least primary level education. The average number of years worked in both samples was approximately 40 years. Among the retirees, 82 % reported being currently married (vs. 84 % in the full sample); around 66 % of older men in both samples lived with their children, but a greater percentage of retirees (53 % vs. 34.7 %) reported the support of kin as their primary source of financial support. Fewer retirees consider their incomes as adequate; only 7.5 % of retirees reported that they have “enough money” compared with the 10 % of older men in the unrestricted sample. In contrast, more retirees than the unrestricted sample (5.1 % versus 4.4 %) responded that they are facing much difficulty meeting expenses with their current income.

Table 1 Summary statistics

Variables	Total sample (N=1745)		Retiree sample (N=1082)	
	Freq./Mean	%/S.D.	Freq./Mean	%/S.D.
Intention to re-enter labour force	–		180	16.6 %
Self-reported overall health				
Very healthy	101	5.8 %	41	3.8 %
Healthy	336	19.3 %	189	17.5 %
Of average health	1068	61.2 %	654	60.4 %
Unhealthy	217	12.4 %	178	16.5 %
Very unhealthy	23	1.3 %	20	1.8 %
Number of items on physical ability and agility checked 'difficult'				
0	1401	80.3 %	806	74.5 %
1	157	9.0 %	116	10.7 %
2–3	113	6.5 %	94	8.7 %
4+	74	4.2 %	66	6.1 %
Other characteristics				
Age (y)	69.2	5.6	70.8	5.4
Race/ethnicity				
Chinese	1223	70.1 %	801	74.0 %
Malay	307	17.6 %	190	17.6 %
Indian	215	12.3 %	91	8.4 %
Currently married (1 vs. 0)	1467	84.1 %	887	82.0 %
Education				
No formal	249	14.3 %	163	15.1 %
Primary	778	44.6 %	508	47.0 %
Secondary	501	28.7 %	272	25.1 %
More than secondary	217	12.4 %	139	12.8 %
Years of working (y)	40.8	9.0	40.1	9.1
Co-residing with child(ren)	1139	65.3 %	715	66.1 %
Kin support most important (1 vs. 0)	606	34.7 %	574	53.0 %
Perceived income adequacy				
Enough money	174	10.0 %	81	7.5 %
Just enough money	1097	62.9 %	687	63.5 %
Some difficulty	398	22.8 %	259	23.9 %
Much difficulty	76	4.4 %	55	5.1 %

Results

Poor health status was associated with a higher likelihood of reporting having retired and a lower probability of having the intention to re-enter the labour force among elderly male Singaporeans. Regression results of the probit model with sample selection (Table 2) showed that for the selection equation of having retired, poor health

Table 2 Probit model of re-entry to the labour force with sample selection for retirement

Variables	Selection equation:		Main equation:	
	Having retired		Intention to re-enter labour force	
	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
Self-reported overall health				
Very healthy	Reference		Reference	
Healthy	0.32*	(0.17)	-0.30	(0.24)
Of average health	0.39**	(0.16)	-0.64***	(0.23)
Unhealthy	0.77***	(0.20)	-0.95***	(0.28)
Very unhealthy	0.77**	(0.39)	-1.10**	(0.46)
Other characteristics				
Age (y)	0.081***	(0.008)	-0.035***	(0.014)
Race/ethnicity				
Chinese	Reference		Reference	
Malay	0.094	(0.103)	-0.32**	(0.14)
Indian	-0.60***	(0.12)	-0.38*	(0.20)
Currently married (1 vs. 0)	-0.20*	(0.11)	-0.012	(0.130)
Education				
No formal	-0.88***	(0.16)	-0.29	(0.22)
Primary	-0.56***	(0.12)	0.031	(0.171)
Secondary	-0.54***	(0.12)	0.15	(0.17)
More than secondary	Reference		Reference	
Years of working (y)	-0.024***	(0.00)	-0.0047	(0.0060)
Coresiding with child(ren)	0.0058	(0.0781)	0.058	(0.102)
Kin support most important (1 vs. 0)	1.63***	(0.10)	-0.10	(0.18)
Perceived income adequacy				
Enough money	Reference		Reference	
Just enough money	0.14	(0.12)	0.035	(0.180)
Some difficulty	0.15	(0.14)	0.40**	(0.20)
Much difficulty	0.50**	(0.22)	0.83***	(0.27)
Constant	-4.45***	(0.54)	1.98*	(1.04)
Correlation (ρ)			0.50	(0.28)
<i>N</i>	1,745 (total)		1,082 (retiree)	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

status was a strong positive predictor of retirement decisions. “Very unhealthy” older men were more likely to have retired than those who reported feeling “very healthy” (reference category), with a positive and statistically significant coefficient of 0.77 ($p < 0.05$). Conversely, in the main equation predicting the intention to re-enter the labour force, male retiree’s poor self-reported health was associated with a lower likelihood of having the intention to re-enter the workforce (coefficient, -1.10; $p < 0.05$). In addition, co-residence with children had a weak and statistically

insignificant effect on predicting the intention to work again. However, if kin members were reported as the first source of old age income support, older men were more likely to have retired. Among retirees, the probability of intending to work again increased with greater difficulty in meeting expenses with their income (coefficient, 0.83; $p < 0.01$) compared with those who perceive their income as adequate.

In both the selection equation and the main equation, the incremental probabilities of retirement and the intention to re-enter the labour force follow a similar pattern in both the self-reported health status (Table 3, Panel A) and the objective health measure of the number of difficulties in physical ability and agility (Panel B). The incremental probability of reporting having retired was shown to increase as self-reported health worsens, and as greater limitations in physical ability and agility are experienced. From the baseline predicted probability of 51.5 % in the reference group of the healthiest respondents who had a self-reported overall health status of “very healthy,” the incremental probability of having retired increased by 20.1 percentage points among those who reported a “very unhealthy” health status. Similarly, respondents who checked a greater number of items on the list of having difficulties in performing physical activities (i.e., 4+) showed a 15.1 percentage point increase in their likelihood of having retired from the baseline predicted probability of 60.0 % in those who did not report any physical limitations. In the group of retirees, the likelihood of having the intention to re-enter the workforce decreased by 23.1 percentage points (from the 28.6 % predicted probability in the reference category) among those who reported a “very unhealthy” status. Correspondingly, an 11.9 percentage point decrease from the 17.9 % predicted probability in the reference category was observed among retirees who had greater difficulties in physical activities (i.e., 4+).

Table 3 Incremental probability of retirement and intention to re-enter labour force by health status

Variables	Having retired		Intention to re-enter labour force	
	Incremental probability ^a	95 % Confidence Interval	Incremental probability ^a	95 % Confidence Interval
Panel A: Subjective measure				
Self-reported overall health				
Very healthy (reference)	(51.5 %)	(43.7, 58.3)	(28.6 %)	(10.4, 46.8)
Healthy	8.5	0.2, 17.2	-8.8	-23.7, 6.1
Of average health	10.3	2.0, 18.5	-16.5	-31.8, -1.2
Unhealthy	20.2	10.2, 30.1	-21.4	-38.4, -4.4
Very unhealthy	20.1	0.9, 39.3	-23.1	-41.7, -4.5
Panel B: Objective measure				
Number of items on physical ability and agility checked ‘difficult’				
0 (reference)	(60.0 %)	(57.9, 62.1)	(17.9 %)	(4.7, 31.1)
1	9.5	2.8, 16.2	2.4	-0.6, 10.3
2–3	11.5	3.2, 19.9	5.0	-4.3, 14.3
4+	15.1	4.3, 25.9	-11.9	-23.0, -1.0

^a Incremental probability denotes percentage points change in predicted probability from the respective reference category. Models controlled for other characteristics in Table 2

Discussion and Conclusion

The study findings suggest that among older Singaporean men, poorer health status was negatively associated with labour supply, not only through a greater likelihood of retirement but also through a lower likelihood of returning to the labour force after retirement. The key results of this study were generally consistent in both the subjective (self-reported overall health) and objective (number of items on physical ability and agility checked ‘difficult’) health measures. As expected, perceived income adequacy in old age was also associated with the intention to re-enter the labour force. The observed association of retirement with considering kin support as an important source of income is likely related to an active labour market status. Older men with some extent of labour force participation are more likely to perceive that their incomes are adequate, which may then reduce dependence on kin support. Although the full sample and the retiree sample had some differences in individual characteristics, the results of our probit model—which accounted for sample selection—indicated that the correlation between the error terms in the two equations may not lead to a biased estimate in the re-entry model. Thus, the model of re-entering the labour market would produce similar results when estimated among the sample of retirees only.

This study has several implications for labour market policy, health policy, and support for the economically vulnerable elderly in Singapore. In terms of labour market policy, our findings suggest that poor health status among the elderly reduces their likelihood of labour force participation, which may considerably slow down government efforts to promote re-employment in this particular group. These findings are consistent with a previous study that demonstrated a significant impact of health on employment among the Indian elderly (Pandey 2009), and others which investigated the role of health in an older worker’s decision to leave the workforce (Jimenez-Martin et al. 2000; Vodopivec and Arunatilake 2011; Zucchelli et al. 2007). Thus, without due consideration of the health status of these older adults, the impact of a policy encouraging retirees to re-enter the workforce may be less than projected. Given the impact of population health on economic growth (Barro 1996; Bloom et al. 2001; Weil 2007; Jorgensen 2010), an equally relevant health policy implication emerges. At the micro-level, the vicious cycle of poverty and ill health observed in many developing economies (McCally et al. 1998) may also be a pertinent issue for a developed country such as Singapore; this complex concatenation between health and the economy underscores the importance of improving health particularly among the middle-aged group, keeping in mind their potential for future re-employment as older adults. This issue is especially relevant amid concerns over population ageing and the increasing burden of chronic non-communicable diseases in ageing societies (Beaglehole et al. 2011). Finally, the study findings highlight the exigencies related to supporting an increasing elderly population who are at risk of poverty and poor health. Individuals with poor health are generally subjected to higher spending for health care; thus, if elderly men with poor health are expected to be less able to work and far less likely to consider re-employment after retirement, this particular group becomes more susceptible to depleting their resources to meet their health care needs—which may have already dwindled following retirement. Moreover, there may be an increased risk for weakening the social security within their families, which could in turn, threaten the traditional family structure (Ng 2011). Ultimately, these well-informed conjectures from the study

findings outline important considerations for ensuring the protection of elderly workers who may decide to rejoin the workforce after retirement.

All these strengths notwithstanding, further research could benefit from addressing the following limitations of the current study. Firstly, the main outcome variable of this study was derived from self-reported responses to the survey question on the intention to re-enter the labour force; responses to this question may not necessarily predict older men's labour force participation after retirement. Scholars have hypothesized that many of those who report that they chose retirement because of failing health are simply providing a socially acceptable excuse for non-work, rather than an accurate description of their decision to leave the labour force (McGarry 2004). This phenomenon has been termed *justification bias*. Furthermore, it is unclear whether the correlation between poor health and retirement represents a *planned* departure from the labour force as a result of an anticipated decline in health, or whether the effect of health operates through health shocks (McGarry 2004), suggesting that subjective proxies for health are endogenous to labour supply choices and may be prone to measurement error (Dwyer and Mitchell 1998). The use of longitudinal data would allow for a more accurate estimate if the actual revealed labour market behaviour of retirees can be evaluated. Several authors have also noted that using self-reported health measures may lead to exaggerated coefficients which could overstate the effect of health on work (Anderson and Burkhauser 1985; Bound 1991; Kerkhofs et al. 1999), and that individual responses on health may depend on labour market status, acting through economic incentives or conformity to social norms (Kerkhofs et al. 1999). A known approach to address these issues is the use of additional health measures that are less prone to misreporting (e.g., physical ability limitations and hospitalization events), and subsequently comparing the coefficient sizes of the different health measures. Disregarding potential heterogeneity of the type of job that the respondent was considering in the intention of labour market re-entry is another important study limitation. Although information on pre-retirement job categories could be used as a proxy for the respondent's potential job type in re-employment, this assumption may not necessarily hold. Given the additional challenge of operationally classifying pre-retirement job categories based on inadequate information and a relatively small sample size of retirees in our data, this study only estimated the overall association of health with the intention of labour market re-entry. Given that accounting for this heterogeneity may be particularly important for policy implications, future research using individual- or firm-level panel data should elucidate the potential differences in labour market retention and re-entry by job category. Finally, our statistical analysis was limited in making strong causal inferences and structural interpretations on health, retirement, and re-entry to the labour force. Some of the explanatory variables in the model, such as coresidence with children, kin support, and perceived income adequacy, were potentially endogenous. In addition, although our probit model with sample selection could be best estimated with a predictor of retirement that is not correlated with re-entry intentions, this identifying information was not available in our data. Thus, caution must be observed in interpreting the study findings supporting the negative correlation between poorer health and the intention of labour market re-entry.

Despite these limitations, the results of this study shed light on the important role of health in older adults' retirement and re-entry to the labour force in Singapore, thereby providing micro-level evidence on the increasingly important interrelationships of

population health with economic growth in a rapidly ageing, developed economy context (Bloom and Canning 2000). As with many other developed countries, Singapore has entered the early stages of an ageing workforce. While the literature has mainly focused on individual responses concerning health status on early retirement, there is less information available on health as a determinant for re-entering the labour force after retirement. Addressing this gap is therefore important given that the direction and magnitude of health effects may be different for the early retirement decision and the decision to re-enter the labour force after retirement. In Singapore, the significant role of older adults in sustainable economic development has been increasingly highlighted in the policy arena and translated into recent policy developments that promote re-employment of older workers. The potential of this policy effort for an effective increase in labour force participation among older individuals is likely to hinge on a number of institutional features such as incentives for older individuals and firms. Our study suggests that in order to maximize this potential, a strong support for maintaining and improving the health of current older and middle-aged workers may be a vital requisite.

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