Effects of health insurance on labour supply: a systematic review

Nga Le
Maastricht Graduate School of Governance, Maastricht University, Maastricht, The Netherlands and Maastricht Economic and Social Research Institute on Innovation and Technology, United Nations University, Maastricht, The Netherlands
Wim Groot
Top Institute for Evidence Based Education Research (TIER), Maastricht, The Netherlands and Maastricht University, Maastricht, The Netherlands
Sonila M. Tomini
Maastricht Graduate School of Governance, Maastricht University, Maastricht, The Netherlands and Maastricht Economic and Social Research Institute on Innovation and Technology, United Nations University, Maastricht, The Netherlands, and
Florian Tomini
Department of Primary Care and Population Health, Institute of Epidemiology and Health Care, University College London Medical School, London, UK

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Abstract

Purpose – The purpose of this paper is to provide a systematic review of empirical evidence on the labour market effects of health insurance from the supply side.

Design/methodology/approach – The study covers the largest peer-reviewed and working paper databases for labour economics and health studies. These include Web of Science, Google Scholar, Pubmed and the most popular economics working paper sources such as NBER, ECONSTOR, IDEAS, IZA, SSRN, World Bank Working Paper Series. The authors follow the PRISMA 2009 protocol for systematic reviews.

Findings – The collection includes 63 studies. The outcomes of interest are the number of hours worked, the probability of employment, self-employment and the level of economic formalisation. The authors find that the current literature is vastly concentrated on the USA. Spousal coverage in the USA is associated with reduced labour supply of secondary earners. The effect of Medicaid in the USA on the labour supply of its recipients is ambiguous. The employment-coverage link is an important determinant of the labour supply of people with health problems and self-employment decisions. Universal coverage may create either an incentive or a disincentive to work depending on the design of the system. Finally, evidence on the relationship between health insurance and the level of economic formalisation in developing countries is fragmented and limited.

Practical implications – This study reviews the existing literature on the labour market effects of health insurance from the supply side. The authors find a large knowledge gap in emerging economies where health coverage is expanding. The authors also highlight important literature gaps that need to be filled in different themes of the topic.

Originality/value – This is the first systematic review on the topic which is becoming increasingly relevant for policy makers in developing countries where health coverage is expanding.

Keywords Systematic review, Health insurance, Labour supply, Labour market

Paper type Literature review

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1. Introduction

Health insurance may have important effects on labour force participation and job mobility (Gruber and Madrian, 2002). In some cases, it has been shown to reduce aggregate employment (Wagstaff and Moreno-Serra, 2015) and increase unemployment (Wagstaff and Moreno-Serra, 2007). In this regard, the theory of static labour supply predicts that non-contributory health insurance, which is not provided by employers, may "make working less attractive" as it helps to ease catastrophic health expenses (Chou and Staiger, 2001). Similarly, Netzer and Scheuer (2007) in their precautionary labour theory suggest that individuals may work less if they are faced with less income uncertainty. This implies that more security in health coverage potentially lowers labour supply if the share of health costs out of the total household expenses is large enough.

Providing non-contributory safety nets outside employment may also undesirably encourage the informal labour market which is often associated with poor work conditions and social security avoidance (Levy, 2010). The rolling out of Seguro Popular programme, a non-contributory health insurance in Mexico for informal workers is found to reduce the inflow into formal sector (Aterido *et al.*, 2011).

Despite the sporadic evidence from selected countries, the international empirical evidence of the labour market effects of health insurance has not been thoroughly reviewed. Previous reviews (Gruber and Madrian, 2002; Madrian, 2006) as well as book chapters (Currie and Madrian, 1999; Gruber, 2000) merely focus on the American healthcare system with its rather unique insurance-employment link, therefore the findings cannot be generalised. Besides, these syntheses may summarise potentially biased results as many of the studies reviewed fail to address the endogeneity of the health insurance – for instance in the case of spousal coverage with assortative mating – or bias arising from unobserved heterogeneity due to the use of cross-sectional data.

The aim of this study is to synthesise empirical evidence on the labour market effects of health insurance from the labour supply side. This is to better inform policy makers in developing countries given the current interest in expanding health coverage under the wave of universal health coverage (Rodin and de Ferranti, 2012; Lagomarsino *et al.*, 2012; Cotlear *et al.*, 2015). Because of the diversity in healthcare coverage, the concept of "health insurance" in this review concerns different types: employment-provided health insurance (which is dominant in the USA and consists of various schemes such as dependent coverage, spousal and employee packages); public health insurance for social assistance recipients; social health insurance and universal health coverage; tax and price subsidies to make health insurance cheaper and more accessible; and other less-known public schemes. The outcomes reviewed include labour force participation (i.e. labour supply at extensive margin), the number of hours worked (i.e. labour supply at intensive margin), self-employment decision, and work in the informal sector. We only focus on the outcomes that we consider most relevant for developing countries. We disregard retirement effects and only focus on labour market effects on the working age people.

Our study is conducted systematically, covering the largest peer-reviewed and working paper databases for economics and health studies. We follow the PRISMA 2009 protocol (Moher *et al.*, 2009) for systematic reviews.

2. Theoretical predictions

This section summarises the theoretical predictions on the effects of health insurance on the outcomes. We discuss the debate over positive vs negative effects of health insurance on labour supply and highlight the difference between labour supply effects at the intensive and extensive margins (i.e. the number of hours worked vs labour force participation). Because we aim to inform policy makers in developing countries, we also discuss the effects of health insurance on self-employment and work informality due to the important role of the informal sector and the self-employed in developing economies.

2.1 Non-contributory health insurance and labour supply: the debate

Despite the varied taxonomy of health insurance, the theoretical debate over the labour supply effects is mainly focussed on non-contributory schemes. The theory of static labour supply predicts that public health insurance, which is not tied to employment, may "make working less attractive" because of a consumption smoothing effect resulting from the removal of unexpected catastrophic health expenses (Chou and Staiger, 2001). The effect however depends on the share of health costs in total household expenses (Chou and Staiger, 2001) and will be more pronounced in the case of low-income recipients or those with large health spending. Studies that rely on the budget constraint approach argue that government-provided health insurance can be considered as a positive income shock subsidised by tax, especially for lower income groups and those who have high health expenses (Boyle and Lahey, 2010). Therefore, universal health insurance or any non-contributory schemes potentially give these individuals a disincentive to work due to the income effect as leisure is a normal good (Boyle and Lahey, 2010). These two theories, based on the income effect whether via consumption smoothing or income increase, consistently predict a negative labour supply as a result of non-contributory health insurance schemes.

However, health insurance as an in-kind benefit is necessarily different from cash transfers because it may not only affect the recipients' labour supply depending on the income or substitution effects, but also have impacts on health and productivity (Boyle and Lahey, 2010, 2016). Intuitively, better health access likely makes the beneficiaries healthier and more productive, enabling them to work more and earn extra income. This health fostering argument, in addition to the allegation of human right violation, is widely used by human rights activists in the global universal health coverage movement. However, the empirical evidence for this argument is relatively thin especially for adults (Sommers *et al.*, 2012) and sometimes mixed (Boyle and Lahey, 2010; Sommers *et al.*, 2012). We have evidence that health insurance expansions reduce child mortality (Currie and Gruber, 1996; Howell *et al.*, 2010) while it does not necessarily translate into better health for adults (Levy and Meltzer, 2001). Levy and Meltzer (2001) highlight that the majority of studies that look at the effects of health insurance on health status are observational studies which are hence unable to draw a causal link, while "most, but not all" quasi experimental studies suggest that health insurance helps to improve health, even though "the interpretation is not always straightforward" (Levy and Meltzer, 2001, p. 5). Drawing a causal link between health insurance and labour productivity is even harder as productivity is difficult to measure and hence not often asked in micro labour surveys. Therefore, finding hard evidence of the positive impacts of health insurance on health and labour supply is not always trivial.

Importantly, the static labour supply theory and simplified budget constraint approach tend to mix two distinctive labour supply effects (i.e. labour force participation and hours worked) under the same umbrella of labour supply. However, while labour force participation refers to the likelihood of participating in the labour market, the number of hours worked reflects the intensity of work on the job. The labour force participation and hours worked responses of low income people to receiving public assistance may differ, as has been shown in empirical studies as well as theoretical work (Saez, 2002). The elasticity of labour supply is significant among low income earners while that of the number of work hours conditional on working are found to be relatively small (Saez, 2002). In modelling the optimal income transfers, intensive vs extensive labour supply responses are often disentangled (see Saez, 2002). Therefore, when considering the income effect of non-contributory schemes which can often be considered as income transfers, it is important to separate the two.

2.2 Health insurance and self-employment: entrepreneurship lock or push

Self-employment responses to health insurance reforms are varied. Employer-provided health insurance is believed to dampen entrepreneurial activities as it incentivises people to stay or move into wage and salary employment for the coverage. This phenomenon is

referred to as "entrepreneurship lock" (Fairlie *et al.*, 2011). On the contrary, delinking health insurance from employment is hypothesised to induce more job mobility towards self-employment and open the lock via different transition paths (Heim and Lurie, 2010). Therefore, the two phenomena in this review will be analysed in the context of the link (or detachment) between health insurance and employment.

2.3 Health insurance and the informal labour

The informal sector is playing an important role in developing economies. The main concern, however, is that expanding non-contributory social safety beyond formal sector may encourage informality which is oftentimes linked to poor working conditions, limited labour protection and even social security avoidance (Levy, 2010). Therefore, despite the large contribution of the informal sector in low and middle income countries, the informalisation of the economy as a result of increased social safety nets in general and non-contributory health insurance in particular may not be intentional. This review wants to test this hypothesis.

3. Methods

The systematic literature review was conducted in agreement with the PRISMA guidelines. PRISMA stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses, developed to reduce the risk of flawed research reporting (Moher *et al.*, 2009; Liberati *et al.*, 2009). PRISMA is a 27-item checklist and a diagram that serves as a guideline for transparent reporting of meta-analyses and systematic reviews (Moher *et al.*, 2009). PRISMA statement has been endorsed by the Cochrane Collaboration in 2009. We use the PRISMA 2009 (Moher *et al.*, 2009) in this paper.

3.1 Information sources

Databases are selected to ensure that all related disciplines (health economics, labour economics, public economics, public policy, health and medical studies) are covered. They include Web of Science, Google Scholar, Pubmed and the most popular economics working paper sources such as NBER, ECONSTOR, IDEAS, IZA, SSRN, World Bank Working Paper Series. The rationale for database selection following PRISMA 2009 Checklist (Moher *et al.*, 2009) is presented in Appendix 10. This review includes publications released after 2000 and written in English.

3.2 Search strategy

The search was implemented using key terms listed in Appendix 11. We combined each of the two keywords representing dependent (labour market effects) and independent (health insurance) variables in the advanced search field, if any available, with colophon "and", and set search locations in all fields (i.e. title, abstract and content).

We used a file-naming protocol to detect and remove duplicates before saving, which helps to minimise duplicates and save screening time. Therefore, our method is slightly different from the workflow illustrated in PRISMA diagram 2009 (see Moher *et al.*, 2009) as we did initial screening before saving. Our search was carried out from October 2015 to January 2016. After the initial search, we carried out snowballing where we only added six working papers published in less known working paper series. This small number of additional papers suggests a relatively high level of accuracy and reliability of the search.

3.3 Study selection

We deliberately do not set any methodology filter as an exclusion criterion. Instead, we discuss how the methodology and quality of the studies reviewed may influence the results if we find any inconsistencies in the results. More detail on the methodology of each reference reviewed is provided in the Appendices.

3.4 Exclusion criteria

We exclude papers that fail to separate health insurance from other benefits under broader terms like social insurance, social assistance, social protection, fringe benefits. Because this review targets empirical evidence, we opt to exclude: *ex-ante* evaluations and simulations; and purely theoretical articles. Studies that compare the labour supply effects of different types of health insurance and healthcare systems are removed since they are not directly relevant. All the papers removed during full-text assessment are reported in Appendix 1. Figure 1 summarises the whole search and screening process based on PRISMA 2009 Flow Diagram (Moher *et al.*, 2009). The final selection consists of 63 papers and articles.

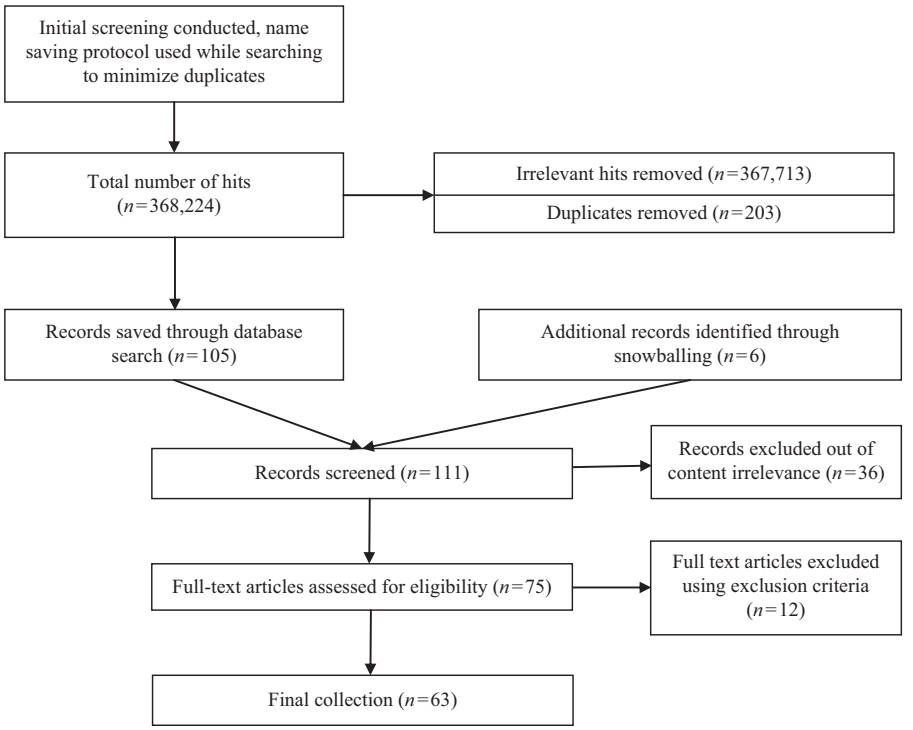
3.5 Data analysis

Due to the huge variation in theoretical underpinnings, methods, definitions of the outcomes as well as the heterogeneity of healthcare systems and health insurance programmes reviewed, we could not use statistical methods for data analysis. Therefore, we decided to conduct a systematic review in a narrative way rather than doing a meta-analysis of the results.

4. Results

4.1 Descriptive results

The majority of the studies found in our search are US-based studies, 47 out of the 63 selected papers. This may reflect the history of the literature where theoretical models



Notes: The number of duplicates is minimised because we used an efficient file-saving protocol which is based on title, publication year and first author of studies. Duplicates were hence notified and removed before saving

Figure 1.
Study selection process

on the relationship between health insurance and labour supply, or between social insurance, social assistance and labour supply are predominantly from the USA. Additionally, the American dominance in this literature may be due to the fact that there is more discussion on the equity-efficiency trade-off in the USA, while notions of equity somehow dominate the debate in other OECD countries. Quasi-experimental designs are the most frequently used (47 in 63 papers), out of which difference-in-differences (DD) and difference-in-difference-in-differences (DDD) are frequently adopted. The collection is relatively diverse in terms of type of health insurance and target groups. However, the aforementioned American focus, which concentrates on US-specific health insurance, limits the generalisation of these findings to the context of developing countries. Therefore, our strategy is to summarise results in the context of specific health systems (Table I).

In Sub-Sections 4.2–4.4, we, respectively, discuss three outcomes: labour supply in terms of labour force participation or hours worked, self-employment decisions, and work in the informal sector. We analyse the effects by different types of health insurance and separate the discussion into inside and outside the USA. When possible, we separate the labour supply effects at the external vs internal margins. Additionally, we categorise the collected studies by experimental, quasi-experimental and non-experimental. Due to the lack of consensus on what is "quasi-experimental", we base on the taxonomy by Rockers *et al.* (2015), who review the use of "quasi-experimental" term in reviews from various disciplines and define the term as consisting of: natural experiments, instrumental variable analysis, regression discontinuity analyses, interrupted times series, controlled before-and-after designs, DD design and fixed effects analyses of panel data. We use the conventional definition of an experimental design: any study with the randomisation of the treatment and control groups. Non-experimental studies hence include all studies that are neither experiment nor quasi-experimental.

Total	63
Topic	66[a]
Labour supply (labour force participation; hours worked)	40
Self-employment	16
Formality	10
Methodology	
Experimental	0
Quasi-experimental	47
Non experimental	16
Where	
USA	47
Non-USA	16
Type of insurance/policy changes	
Spousal coverage for secondary earners (employer-provided)	8
Dependent coverage for young adults (employer-provided)	6
Employer-provided health insurance	7
Public health insurance for assistance recipients	14
Tax subsidy to make health insurance cheaper for informal workers	4
Rising premiums	2
Universal coverage	12
Other reforms that expanse coverage	10

Table I. Summary of the final collection

Note: [a]There are three double-counting cases, one paper looks at labour supply and self-employment, the other two examine labour supply and informality

4.2 Labour supply effects of health insurance

Spousal coverage and labour supply of secondary earners. We have identified six papers using US-based data as shown in Table II (for detailed information, see Appendix 2) on the effect of health care coverage on the labour supply of secondary income earners.

As indicated in Table II, methodologies are mixed with both quasi-experimental and non-experimental techniques being used. Despite the methodological variation, the prevailing evidence (five out of six articles) suggests a negative impact of spousal health coverage on labour supply of secondary earners in the USA in term of decreases in employment likelihood (Murasko, 2008; Kapinos, 2009; Cebi and Wang, 2013), probability of working full-time (Royalty and Abraham, 2006; Kapinos, 2009; Wenger and Reynolds, 2009; Cebi and Wang, 2013) and work hours (Wellington and Cobb-Clark, 2000; Murasko, 2008; Cebi and Wang, 2013). However the effect size appears to become much smaller after controlling for unobserved heterogeneity (Cebi and Wang, 2013). This literature in this topic evolved significantly, with a particular focus on methodological improvement to account for the endogeneity of spousal coverage due to assortative mating. Therefore, studies since Royalty and Abraham (2006) are more methodologically reliable. This improvement however does not change the main conclusion of the negative effect of spousal coverage because earlier studies (e.g. Wellington and Cobb-Clark, 2000) yield the same results.

Dependent coverage and labour supply of young adults. Table III presents the findings of four studies analysing the labour supply of young adults who get access to health insurance via their parents' employers (see Appendix 3 for detailed information).

Again, all publications found in this topic are about the USA and they all use quasi-experimental methods. The effects of dependent coverage on labour supply of American young adults are mixed. The probability of labour force participation appears not to be affected (Antwi *et al*., 2013; Depew, 2015) but the likelihood of working full-time is reduced (Antwi *et al*., 2013; Hahn and Yang, 2016; Depew, 2015). From another perspective, disenrollment at the age cut-off of 25 seemingly urges young adults in the USA to work more and become more active in the labour market (Dahlen, 2015). However, with the small number of studies, it is difficult to provide any definite conclusion on this issue.

Health insurance and labour supply of people with health impairments. Table IV summarises the results of three papers from the USA on the labour supply effects for people with health impairments (see more details in Appendix 4).

Labour supply of people with health impairments seems sensitive to the link between health coverage and employment. Employment-linked health insurance tends to keep them staying in employment to avoid coverage loss in the face of future health costs. The effect is positive for cancer survivors (Tunceli *et al*., 2009) and people with other health impairments (Bradley *et al*., 2012). However, if health insurance is not tied to employment, health insurance is more likely to reduce labour force participation. This is the finding of Page (2011) who evaluated the impact of the US's Medicare expansion which increases medication coverage for newly recovered kidney transplant patients although this specific medical coverage might not reflect the effect of general health insurance. The two behaviours are straightforward as people with health problems often depend heavily on health insurance while the incentive to work is negatively affected by their health status. However, the limited number of studies on this issue prevents us from drawing an unequivocal conclusion, therefore the evidence is preliminary and merely serves as a suggestion for further future research.

Health insurance and labour supply of public assistance recipients. Table V summarises the findings on the effect of health insurance on labour supply of assistance recipients who are mainly low income adults with dependents (i.e. single mothers). We have 14 papers in total, 13 of which are from the USA and investigate health assistance schemes such as Medicaid or Children's Health Insurance Program (CHIP)[1] or state-level health insurance interventions.

Table II.
Labour supply effect of employer – provided spousal coverage

No.	Study	Sign	Effect magnitude	Methodology	Data	Level of analysis	Insurance	Country
1	Wellington and Cobb-Clark (2000)	–	98 reduced hours per year on average (approximately 61 h due to a withdrawal from the labour force and 37 h due to a reduction in the average hours worked) 6.2% decrease in labour supply for the whole US economy	*N*	CS	Individual	SC	USA
2	Royalty and Abraham (2006)	–	10 and 21 pp decrease in the probability of working full-time for women and men, respectively 14.4 and 19.5 pp decrease in the probability of working 20 hours or more per week for women and men, respectively	*Q*	Panel	Individual	SC	USA
3	Murasko (2008)	–	7.9–18.7 pp decrease in probability of labour force participation 1.01–12.9 reduced weekly hours for those working	*N*	Panel	Individual	SC	USA
4	Kapinos (2009)	–	16 pp decrease in probability of labour force participation 13–25 decrease pp in probability of working full-time	*Q*	Pooled CS	Individual	SC	USA
5	Wenger and Reynolds (2009)	– and 0	2.3 pp decrease in fulltime work for men if wives have employer provided insurance No effect on part-time job for men 3.3 pp decrease in part-time work for women if husbands have employer provided insurance No effect on fulltime work for women	*Q*	Pooled CS	Individual	SC	USA
6	Cebi and Wang (2013)	–	5.2–18.4 pp decrease in likelihood of working fulltime 0.5–9.4 pp decrease in employment likelihood 0.98–3.7 reduced work hours	*Q*	Panel	Individual	SC	USA

Notes: pp, Percentage point; value "0" in the sign section means statistically insignificant; SC, spousal coverage in the USA; Methodology: *N*, non-experimental; *Q*, quasi-experimental; CS, cross section, Pooled CS, pooled cross-sections

No.	Study	Sign	Effect magnitude	Methodology	Data	Level of analysis	Country
1	Antwi *et al.* (2013)	– and 0	2.0 pp decrease (5.8% increase) in likelihood of full-time work 3% decrease in weekly work hours No effect on employment probability	*Q*	Panel	Individual	USA
2	Hahn and Yang (2016)	–	3.1 pp decrease in likelihood of full-time work (2.6 pp decrease for women and 3.7 pp decrease for men) 2.1 pp decrease in employment likelihood	*Q*	Pooled CS	Individual	USA
3	Depew (2015)	– and 0	2.65 pp decrease in likelihood of full-time work (3.7 pp decrease for women and 2.24 pp decrease for men) No effect on labour supply participation for men 1.5 pp decrease in labour supply participation for women	*Q*	Panel	Individual	USA
4	Dahlen (2015)	–	Aging out (dependent coverage disenrollment at the cut-off 26 years old) is associated with 7.9 pp increase in employment likelihood and 9.7% increase in the labour market participation for men	*Q*	Pooled CS	Individual	USA

Notes: *Q*, Quasi-experimental; pp, percentage point. Value "0" in the sign section means statistically insignificant

Table III.
Labour supply effect of dependent coverage

No.	Study	Sign	Effect magnitude	Methodology	Data	Level of analysis	Country
1	Tunceli *et al.* (2009)	+	23.6–32.1 pp decrease in exit likelihood for men 13.9–16.9 pp decrease in exit likelihood for women 34.7–42.2 pp decrease in likelihood of job change for men 19.1–28 pp decrease in likelihood of job change for women	*Q*	Panel	Individual	USA
2	Page (2011)	–	10% increase in coverage amount leads to 0.8–2.3 pp decrease of employment likelihood	*Q*	Panel	Individual	USA
3	Bradley *et al.* (2012)	+	30 pp increase in likelihood to stay in employment	*Q*	Panel	Individual	USA

Note: *Q*, Quasi-experimental

Table IV.
Health insurance and labour supply of people with health impairments

The US-based evidence is mixed (see Table V). Interestingly, if zooming in into individual programmes, we see that the results are ambiguous even within the same programme. For instance, the labour supply effect of Medicaid introduction and expansion is negative (Rosen, 2014; Dave *et al.*, 2015), insignificant (Ham and Shore-Sheppard, 2005; Strumpf, 2011;

Table V.
Health insurance and labour supply of assistance recipients

No.	Study	Sign	Effect magnitude	Methodology	Data	Level of analysis	Country
US studies – The introduction or expansion of Medicaid							
1	Montgomery and Navin (2000)	− and 0	0–0.15 pp decrease in working probability 0–0.004 decrease in hours worked per weak	*Q*	Pooled CS	Individual	USA
2	Yelowitz (2003)	− and 0 and +	0–7.1 pp increase in likelihood of labour force participation (due to increase in income limit) 1.7–4.2 pp decrease in likelihood of labour force participation (due to increase coverage for children)	*Q*	Pooled CS	Individual	USA
3	Ham and Shore-Sheppard (2005)	0	Statistically insignificant on labour force participation	*N*	Pooled CS	Individual	USA
4	Strumpf (2011)	0	Statistically insignificant on labour force participation	*Q*	Pooled CS	Individual	USA
5	Rosen (2014)	−	An increase of 6.07 h worked per week for those who are without Medical aid	*N*	CS	Individual	USA
6	Dave *et al.* (2015)	−	20 pp increase in eligibility would reduce employment likelihood by 1.7–7.2 pp	*Q*	Pooled CS	Individual	USA
7	Gooptu *et al.* (2016)	0	Statistically insignificant on labour force participation, hours worked	*Q*	Pooled CS	Individual	USA
US studies – Children's Health Insurance Program							
8	Tomohara and Lee (2007)	− and 0	No effect on hours worked for women in general A decrease of 2–4 h worked per week for non-white women	*Q*	Pooled CS	Individual	USA
9	Lee and Tomohara (2008)	− and 0	No effect on labour force participation in general 8–10.6 pp decrease in employment likelihood for non-white women	*Q*	Pooled CS	Individual	USA
US studies – Affordable Care Act and other state level programmes							
10	Guy *et al.* (2012)	−	2.2 pp decrease in full-time employment 0.8 pp increase in part-time employment 1.4 increase in likelihood of not working	*Q*	Pooled CS	Individual	USA
11	Moriya *et al.* (2016)	0	Statistically insignificant effect on part-time employment	*N*	Pooled CS	Individual	USA
12	Garthwaite *et al.* (2014)	−	0.3–0.6 pp decrease in aggregate employment rate (or an immediate increase in labour supply due to disenrollment)	*Q*	Pooled CS	Aggregate	USA
13	Dague *et al.* (2017)	−	2.4–10.6 pp decrease in employment likelihood	*Q*	Panel	Individual	USA
Non-US studies							
14	Bérgolo and Cruces (2014)	+	1.6 pp increase in benefit eligible registered employment	*Q*	Pooled CS	Individual	Uruguay

Notes: *Q*, Quasi-experimental; *N*, non-experimental. CS, cross section; Pooled CS, pooled cross-sections. Value "0" in the sign section means statistically insignificant

Gooptu *et al.*, 2016) or both (Montgomery and Navin, 2000; Yelowitz, 2003). Notably, these studies have many things in common: they use the same data source (Current Population Survey), share rather similar methods (almost all of them combine different methods such as DD or DDD or panel techniques with one exemption paper by Ham and Shore-Sheppard, 2005 that uses a Tobit model) and mostly adopt a similar definition of labour supply in terms of probability of employment or hours worked. One possible explanation for the mixed findings is that these studies cover different periods ranging from 1963–1975 in Strumpf (2011) to the most recent 2005–2015 period in Gooptu *et al.* (2016). Additionally, the studies vary slightly in the research subject: married women (Yelowitz, 2003), single women (Strumpf, 2011) or single mothers (Ham and Shore-Sheppard, 2005; Rosen, 2014), women with dependents irrespective of marital status (Montgomery and Navin, 2000), pregnant women (Dave *et al.*, 2015) or the poor in general (Gooptu *et al.*, 2016). What we can conclude is that different groups of low-income assistance recipients tend to react differently to Medicaid expansion.

Similarly, the effect of CHIP on the labour supply of women is mixed (Tomohara and Lee, 2007; Lee and Tomohara, 2008). However, a closer look into the demographics reveals initial evidence that non-white women tend to work less hours (Tomohara and Lee, 2007) or reduce labour participation (Lee and Tomohara, 2008) while the effect for white women are statistically insignificant (Tomohara and Lee, 2007; Lee and Tomohara, 2008). The authors explain that non-white married women tend to reduce labour supply just to make their children qualified for the benefits (Tomohara and Lee, 2007; Lee and Tomohara, 2008).

Affordable Care Act[2] and other state-level expansions of public health schemes tend to create a disincentive to work to less educated adults (Garthwaite *et al.*, 2014) and low-income and childless adults (Guy *et al.*, 2012; Dague *et al.*, 2017). These, consistent with theoretical predictions, imply sizable labour supply distortion of public health insurance expansions to low-income adults (Guy *et al.*, 2012; Garthwaite *et al.*, 2014; Dague *et al.*, 2017).

There is scarce evidence on this aspect outside the USA. A paper in Uruguay (Bérgolo and Cruces, 2014) that delves into the extension of health coverage to dependent children of registered private sector workers reports that people tend to increase their labour supply in the benefit-eligible employment sector to make their children eligible for health insurance. Notwithstanding, this is the only study on this topic outside the USA.

Labour supply effects of universal health coverage. Our search revealed only five papers looking at the labour supply effects when the country aims to achieve universal coverage. These studies are summarised in Table VI. The results are mixed and vary between negative (Chou and Staiger, 2001; Kan and Lin, 2009), statistically insignificanft (Chou *et al.*, 2002), positive (Wagstaff and Manachotphong, 2012) or both negative and statistically insignificant (Liao, 2011). The result for Taiwan is relatively puzzling given the fact that the four studies examine the same 1995s UHC expansion and use the same data source (three out of four Taiwan-based studies employ the Survey of Family Income and Expenditure) yet yield different results. This is probably explained by the difference in data range used and research subjects (see more details in Appendix 6).

The positive case of Thailand is rather interesting as a lesson learned on how to trigger positive labour market effects while expanding health coverage universally. In-depth examination of the Thailand case reveals that the Thai UCH reform in 2001 is indeed not fully universal as it merely targets formal employees first. The reform can thus incentivise working-age household members to seek formal jobs and participate in the labour market (Wagstaff and Manachotphong, 2012). This is why the largest effect size is observed for Thai married women, who were more likely to work less before the reform (Wagstaff and Manachotphong, 2012).

The remaining studies which do not fit in any of the above categories are presented in Table VII. It is obvious from Table VII that this collection is extremely fragmented.

Table VI.
Universal health coverage and labour supply effects

No.	Study	Sign	Magnitude	Methodology	Data	Level of analysis	Intervention	Country
1	Chou and Staiger (2001)	−	4 pp decrease in employment probability of married women	*N*	Pooled CS	Individual	UHC in 1995	Taiwan
2	Chou *et al.* (2002)	0	Statistically insignificant effect on labour supply of married women	*Q*	Pooled CS	Individual	UHC in 1995	Taiwan
3	Kan and Lin (2009)	−	a decrease of 2 work hours per week for private sector employees	*Q*	Pooled CS	Individual	UHC in 1995	Taiwan
4	Liao (2011)	−and 0	17.8–21.7 pp reduction in labour force participation of married women in the second income quartile No significant effect for other income groups	*Q*	Pooled CS	Individual	UHC in 1995	Taiwan
5	Wagstaff and Manachotphong (2012)	+	3.3–7 pp increase in employment for single men 2.3–7.5 pp increase for single women 6.1–11.6 pp increase for married women	*Q*	Panel	Individual	UHC in 2001	Thailand

Notes: *Q*, Quasi-experimental; *N*, non-experimental; UHC, universal heal coverage expansion; Pooled CS, pooled cross-sections

Table VII.
Health insurance and labour supply effects in isolated papers

No.	Study	Sign	Magnitude	Methodology	Intervention	Data	Level of analysis	Target population	Country
Employer-provided health insurance for employees									
1	Kaestner and Simon (2002)	+ and 0	No effect on the number of weeks worked 0.4–0.7 increase in hours per week for employees in medium firms	*N*	Employer-sponsored health insurance reform	Pooled CS	Individual	People aged 18–54	USA
2	Wolaver *et al.* (2003)	–	0.8–5.4 pp decrease in full-time employment for low wage workers	*N*	Employment-tied health insurance	Pooled CS	Individual	Working individuals	USA
Rising premium									
3	Baicker and Chandra (2005)	–	8% decrease in full-time work 6% decrease in employment (associated with 40% increase in premium)	*Q*	Rising health insurance premiums	Pooled CS	Aggregate	Working age individuals	USA
4	Baicker and Chandra (2006)	–	1.2 pp decrease in aggregate employment probability 2.4% decrease in hour worked 1.9 pp increase in likelihood of part-time work (associated with a 10% increase in health insurance premiums)	*Q*	Rising health insurance premiums	Pooled CS	Aggregate	Individuals aged 22–64	USA
Social health insurance									
5	Wagstaff and Moreno-Serra (2007)	–	100% increase in unemployment rate 6.7–10 pp decrease in employment-to-population ratio	*Q*	Social Health Insurance	Panel	Aggregate	Working age individuals	CA
6	Wagstaff and Moreno-Serra (2015)	–	10% decrease in employment	*Q*	Social Health Insurance	Panel	Aggregate	Working age individuals	EE and CA
Others									
7	Boyle and Lahey (2010)	–	2.7–3.33% more likely not working as a result of gaining coverage	*Q*	Expansion of health insurance for veterans	Pooled CS	Individual	Male veterans aged 55–64	USA
8	Boyle and Lahey (2016)	+ and –	1–2 pp increase in employment likelihood for women if their husbands receive veterans affairs insurance 0.75 pp decrease in employment likelihood for male veterans 1.46 pp decrease in likelihood of working part-time for male veterans	*Q*	Veterans affairs expansion	Pooled CS	Individual	Senior married couples aged 55–64	USA

Notes: *Q*, Quasi-experimental; *N*, non-experimental; CA, Central Asia; EE, Eastern Europe; Pooled CS, pooled cross-sections

However, we still observe several important trends. First, as a worrying trend, the expansion of social health insurance in Eastern Europe and Central Asia during 1990–2004 has been associated with an increase in unemployment (Wagstaff and Moreno-Serra, 2007) and a decline in the employment ratio (Wagstaff and Moreno-Serra, 2007, 2015). Second, in the USA where health insurance is mainly tied to employment and provided by employers, any increase in health insurance premiums is borne largely by employees via an increase in unemployment (Baicker and Chandra, 2005) and a decrease in hours worked (Baicker and Chandra, 2005, 2006).

4.3 Health insurance and self-employment

Table VIII presents the findings of studies on the relationship between health insurance and self-employment. Unsurprisingly, a dominant number of studies are from the USA (14 out of 16).

Healthcare or tax reforms that increase tax deductibility or provide tax subsidies for the self-employed tend to increase the probability of self-employment in the USA (Heim and Lurie, 2010; Gurley-Calvez, 2011; Velamuri, 2012; Gumus and Regan, 2015).

Interestingly, the contradicting effect signs do not conflict but complement each other and provide varied insights from distinctive angles. On the one hand, general coverage expansion is positively correlated with self-employment (Niu, 2014; DeCicca, 2007; Becker and Tuzemen, 2014). On the other hand, "entrepreneurship lock" which implies a negative effect of employment-linked insurance on self-employment (Fairlie *et al.*, 2011; Zissimopoulos and Karoly, 2007) is evidenced. We also find preliminary evidence of a self-employment effect of dependent coverage (Jia, 2014) and spousal coverage (Wellington, 2001; Gai and Minniti, 2015) but the results are rather mixed and the number of existing studies on this topic is relatively thin.

We found only two publications outside the USA, one for Central Asia (Wagstaff and Moreno-Serra, 2015) and the other for Germany (Fossen and König, 2017). These two papers fall into the two literature strands described above. Fossen and König (2017) find entrepreneurship lock in a public health insurance system in Germany where public health insurance is mandatory for public sector workers but not for the self-employed, whereas social health insurance expansions in Eastern Europe and Central Asia seem to increase self-employment.

In summary, the relationship between health insurance and self-employment strongly depends on whether health insurance is linked to employment. We find evidence both inside and outside the USA for "entrepreneurship lock" and entrepreneurship push. Additionally, tax reforms that reduce insurance premiums seem to promote self-employment.

4.4 Health insurance and economic formalisation

The ten studies found on the informal work are summarised in Table IX.

Accordingly, Table IX shows that the effects are not uniform. In Thailand, effects of universal health coverage on economic formalisation differ across population groups (Wagstaff and Manachotphong, 2012). Two papers in Mexico (Aterido and Hallward-Driemeier, 2011; Bosch and Campos-Vazquez, 2014) find that the Seguro Popular programme which provides non-contributory health insurance for informal sector workers reduce the inflow into formal employment. This result is expected and consistent with the case of Columbia (Camacho *et al.*, 2013). The other two papers on the same programme however report statistically insignificant results (Campos-Vazquez and Knox, 2013; Azuara and Marinescu, 2013). This inconsistency is explained by the difference in data periods as well as the research subjects. In particular, the programme does not have any effect on the likelihood of working informally (Azuara and Marinescu, 2013) nor transition into informal sector (Campos-Vazquez and Knox, 2013) of urban individuals. In contrast, it appears to reduce the likelihood of working informally at both individual and household levels

Table VIII. Health insurance and self-employment

No.	Study	Sign	Magnitude	Methodology	Data	Level of analysis	Country
US studies – Tax subsidy or tax deductibility to reduce premiums for informal workers							
1	Heim and Lurie (2010)	+	1.5 pp increase in self-employment likelihood 0.8 pp increase in self-employment entry 2.8 pp decrease in exit	*Q*	Panel	Individual	USA
2	Gurley-Calvez (2011)	+	7.4% decrease in self-employment exit is associated with tax deductibility for health insurance	*Q*	Panel	Individual	USA
3	Velamuri (2012)	+	34% and 56% increase in self-employment for single and married women relative to controls 10% increase in self-employment for single women relative to married women	*Q*	Pooled CS	Individual	USA
4	Gumus and Regan (2015)	+	8.1% increase in entry into self-employment for men 24.4% increase in entry for single men 11.2% decrease in exit rate	*Q*	Pooled CS	Individual	USA
US studies – Spousal coverage							
5	Wellington (2001)	+	2.3–4.4 pp increase in self-employment likelihood for husbands who get coverage via their spouse's employers 1.2–4.6 4 pp increase in self-employment likelihood for wives who get coverage via their spouse's employers	*Q*	Pooled CS	Individual	USA
6	Gai and Minniti (2015)	+ and −	0.5–2 pp increase in the likelihood of self-employment of the other spouse if a spouse is health insurance holder 1.74–2.09 pp decrease in the likelihood of switching to self-employment of the policy holder	*Q*	Panel	Individual	USA
US studies – Employer-provided health insurance							
7	Zissimopoulos and Karoly (2007)	−	0.7 pp decrease in transition to self-employment for salary men 0.1 pp decrease in transition to self-employment for salary women	*N*	Panel	Individual	USA
8	Fairlie *et al.* (2011)	−	0.013 pp increase in business ownership rate for those at 65 years old (the threshold of aging-out) Not significant effect just before or after others groups aged 55–75	*Q*	Pooled CS	Individual	USA

(*continued*)

Table VIII.

No.	Study	Sign	Magnitude	Methodology	Data	Level of analysis	Country
US studies – Dependent coverage							
9	Bailey (2017)	0	Statistically insignificant	*Q*	Pooled CS	Individual	USA
10	Jia (2014)	+ and 0	No impact on entry decision for serious start-ups 2.3–3.6 pp increase in the likelihood of self-employment entry	*N*	Panel	Individual	USA
US studies – Others							
11	DeCicca (2007)	+	1.1–1.5 pp increase in self-employment likelihood	*Q*	Pooled CS	Individual	USA
12	Niu (2014)	+	0.71 pp increase in self-employment likelihood	*Q*	Pooled CS	Individual	USA
13	Becker and Tuzemen (2014)	+	0.5–0.8 pp increase in the share of self-employment in total employment 0.3–0.6 pp increase in share of total self-employment in total working age population	*Q*	Pooled CS	Aggregate	USA
14	Chavda (2016)	0	Statistically insignificant	*Q*	Pooled CS	Aggregate	USA
Non-US studies – Other types							
15	Wagstaff and Moreno-Serra (2015)	+	17% increase in self-employment	*Q*	Panel	Aggregate	28 EE and CA
16	Fossen and König (2017)	–	0.38 pp decrease in entry into self-employment (associated with an increase of 100 Euro in monthly premium)	*N*	Panel	Aggregate	Germany

Notes: *Q*, Quasi-experimental; *N*, non-experimental; EE and CA, Eastern European and Central Asia countries; Pooled CS, pooled cross-sections

Table IX.
Health insurance and economic formalisation

No.	Study	Sign	Magnitude	Methodology	Data	Level of analysis	Country
US studies – Employer- provided health insurance							
1	Ahearn *et al.* (2013)	(+) Formality	19 pp increase in off-farm employment likelihood	*N*	CS	Individual	US
Universal Health Coverage							
2	Liao and Taylor (2010)	(–) Formality	9.6–13.6 pp decrease in off-farm labour force participation of wives	*Q*	Pooled CS	Individual	Taiwan
3	Aterido *et al.* (2011)	(–) Formality	3.1 pp decrease (a 20% decline) in entry into formality	*Q*	Panel	Individual Household	Mexico
4	Wagstaff and Manachotphong (2012)	(–) Formality for men (+) Informality for all	3 pp decrease in formal employment for men 5.8–10.2 pp increase in informal employment for single men 4–7.4 pp increase for married men 4.6–8.2 pp increase for single women 6.7–12.5 pp increase for married women	*Q*	Panel	Individual	Thailand
5	Azuara and Marinescu (2013)	Statistically insignificant on informality	Statistically insignificant	*N*	Panel	Individual	Mexico
6	Campos-Vazquez and Knox (2013)	Statistically insignificant on informality	Statistically insignificant	*Q*	Panel	Aggregate Individual	Mexico
7	Bosch and Campos-Vazquez (2014)	(–) Formality	0.8–4.6% decrease in number of formal SME enterprises	*Q*	Panel	Aggregate	Mexico
8	Camacho *et al.* (2013)	(+) Informality	4 pp increase in informal employment	*N*	Pooled CS	Individual	Colombia
Social Health Insurance that is financed by payroll tax							
9	Wagstaff and Moreno-Serra (2007)	Statistically insignificant on informality	Statistically insignificant	*Q*	Panel	Aggregate	Central Asia
Others							
10	Bérgolo and Cruces (2014)	(+) Formality	1.3 pp increase in likelihood to switch from informal to formal employment	*Q*	Pooled CS	Individual	Uruguay

Notes: *Q*, Quasi-experimental; *N*, non-experimental; pp, percentage point; Pooled CS, pooled cross-sections

(Aterido *et al.*, 2011) and the number of registered SME enterprises in Mexico (Bosch and Campos-Vazquez, 2014).

Another trend is that people move into the sector where health insurance is available. The healthcare reform in Uruguay which extended coverage to registered workers' children successfully pushed people to move into the formal sector (Bérgolo and Cruces, 2014). Similarly, farm households in the USA allocate more of their time to off-farm work, which is more likely in formal and bigger firms, to get employer-provided health coverage (Ahearn *et al.*, 2013). If health insurance is not linked to employment as in the case of Taiwan's universal health coverage reform, labour supply of farm households' wives in off-farm jobs tends to decline (Liao and Taylor, 2010).

Indeed, it is difficult to draw a definite conclusion about the effect of health insurance on economic formalisation especially in the developing world because of the fragmented and limited number of studies.

5. Discussion

This study reviews the existing literature on labour market effects of health insurance from the supply side. We find that the studies come dominantly from the USA, suggesting a large knowledge gap in other countries, especially in emerging economies where health coverage is expanding (Rodin and de Ferranti, 2012; Lagomarsino *et al.*, 2012; Cotlear *et al.*, 2015). We show that the employer-provided health insurance system in the US has a strong impact on labour supply. We confirm findings by Gruber and Madrian (2002) and Madrian (2006) that: spousal coverage is associated with reduced labour supply of secondary earners; and the labour supply effect of social assistance recipients of Medicaid is ambiguous. Importantly, at the time of these reviews, their collection mostly included papers on Medicaid. A decade later, we see that the literature on social assistance recipients has been expanded to also cover other programmes including CHIP, Affordable Care Act and other state-level interventions. We have preliminary evidence that non-white low income women tend to reduce their labour supply to keep their children qualified for CHIP (Tomohara and Lee, 2007; Lee and Tomohara, 2008), whereas Affordable Care Act and other similar schemes seem to create a disincentive to work for low-income adults who are normally ineligible for normal public health insurance (Guy *et al.*, 2012; Garthwaite *et al.*, 2014; Dague *et al.*, 2017).

Additionally, by focussing on more recent studies with more advanced econometrics techniques, we find that the effect size of spousal health insurance is much smaller after controlling for unobserved heterogeneity (Cebi and Wang, 2013). The disincentive to work for secondary earners in the USA is as expected and consistent with theoretical predictions based on the income effect. However, it might be more interesting to analyse the phenomenon in tandem with intra-household labour supply decision making to better understand the underlying mechanisms of this result. This evidence might be a suggestion for future studies on secondary earners in less developed countries where health coverage is expanding.

The institutional link between health insurance and employment, which strongly affects labour supply and self-employment decisions, provides important policy implications in view of the human rights-based movement for universal health coverage. The mixed results of studies on Medicaid recipients combined with preliminary evidence of labour supply distortion by CHIP and Affordable Care Act seem consistent with the current theoretical debate. Notably, the results show mostly mixed results that vary between negative and insignificant effects, implying that the potential positive effect induced by improved health or productivity (if any) is not strong enough to dominate the income effect. Given the current theoretical debate and the mixed empirical results, we can conclude that more research is needed. It is also interesting to examine the mechanisms through which low income people react to health insurance availability and expansion. Previous studies have suggested that Medicaid recipients either reduce their labour supply (Rosen, 2014; Dave *et al.*, 2015) or are

not really affected by health insurance coverage (Ham and Shore-Sheppard, 2005; Strumpf, 2011) or both (Montgomery and Navin, 2000; Yelowitz, 2003). It is however unknown how, and under which circumstances, they would react differently as the difference in the data range and target population do not seem to explain all the variation in the effect sign. This topic is very relevant for developing countries where government-provided social protection is expanding for the poor and the disadvantaged in response to universal health coverage and human rights-based movements.

The fragmentation and scarcity of studies on economic formalisation and self-employment in the developing world are notable. Additionally, the evidence of reduced employment (Wagstaff and Moreno-Serra, 2007, 2015) and increased unemployment (Wagstaff and Moreno-Serra, 2015) induced by social health insurance in Central Asia and Eastern Europe may serve as a trigger for further research to address the concern about these undesirable effects.

Importantly, there seem to be an implicit assumption in the labour supply literature that working more is better while working conditions are mostly ignored. Even though increasing aggregate labour supply is good for economic growth, there is increasing concern about the rise of precarious and non-standard employment which is often associated with labour insecurity and negative health outcomes (Quinlan, 2015). Therefore, the working-more-is-better assumption should be carefully contextualised in policy making to avoid unintended social impacts on employees.

This study complements previous reviews in many ways. While previous reviews have mainly focussed on the USA, this review moves beyond that to bring new insights from elsewhere. Additionally, our study is conducted in a systematic way providing a transparent search procedure which makes the results reproducible. By focussing on studies published after 2000, our reviewed studies address methodological issues in the pre-2000 literature and form a more varied collection. One important caveat raised by Gruber and Madrian (2002) is that almost all of the spousal coverage studies before 2000 assume that husband's employer-provided health insurance coverage is exogenous, which is not necessarily true. The exogeneity assumption is problematic as couples can make joint labour supply and employment choices (Gruber and Madrian, 2002) and because unobserved characteristics can be correlated with spousal health insurance via assortative mating (Murasko, 2008; Royalty and Abraham, 2006). Another limitation of the pre-2000 studies lie in data constraint where some of them used cross-sectional data (i.e. Olson, 1998; Buchmueller and Valletta, 1999) and hence could not adequately address the effect of unobserved heterogeneity. This was addressed by later studies included in our review which aimed to fix those issues. For instance, Royalty and Abraham (2006) addressed the endogeneity issue caused by assortative mating by allowing health insurance of both spouses to be endogenous and used "paid sick leave" as an instrument. Kapinos (2009) followed Olson (2002) and employed husband's union status and firm size as instruments for health coverage. Alternatively, Murasko (2008) and Zimmer (2010) used panel data techniques while Cebi and Wang (2013) employed different approaches from cross-sectional data techniques, instrumental variables to panel data specifications to account for both heterogeneity and endogeneity.

Regarding the quality and robustness of the reviewed papers, we observe that the majority (47 out of 63) use quasi-experimental techniques. Additionally, there is no severe case of methodological sensitivity except the inconsistency in studies of Medicaid in the USA (see Table V) and Taiwan's Universal Health Coverage (see Table VI). The variations are, however, explained by the variation in the target population and data periods. Therefore, our removal of the publication filter (while many reviews normally include only studies published in peer-reviewed journals) manages to guarantee the internal validity of this synthesis.

It is important to emphasise that methodologies used by the studies reviewed vary while the findings are compiled mainly based on the effect size and magnitude. It is unnecessary and impossible to evaluate each study separately on the risk of bias. Instead, we have tried

to adequately inform readers by providing comprehensive appendices with information on methodologies used, database, sample size, type of insurance and target group so that more in-depth analysis can be made if desired.

The dominance of the US studies remains one of the main limitations of our study, especially if we are to inform policy making in developing countries. Therefore, the evidence reviewed may not be able to provide many of lessons learned for developing countries where health insurance is not usually provided by employers. However, this once again highlights the need for more research in developing countries on the topic.

6. Conclusion

This review finds that the effects of health insurance on labour supply have been mostly studied in the USA, highlighting a real literature gap on this topic in other parts of the world. Therefore, the synthesis of the most recent literature can only provide a partial picture mostly applicable to the USA and some other isolated cases. Given the diversity of insurance schemes in different healthcare systems, we examine the effect by type of health insurance with its specific target population. There are six conclusions we can draw from the review. First, spousal coverage in the USA seems to induce a disincentive to work for secondary earners, who are in most cases wives. However, the effect becomes smaller after applying more advanced econometrics techniques. Second, we have preliminary evidence that dependent young adults in the USA who can access health insurance via their parents' employer reduce their work hour as being less likely to participate in full-time employment. On the other hand, this group tends to increase their employment when ageing out of this benefit. Third, we find preliminary evidence that labour supply of people with health impairments is sensitive to the link between health coverage and employment, which tends to keep them staying at work to avoid coverage loss in the face of future health costs while discouraging them to work if they have no health coverage. Fourth, the labour supply effects of health insurance on Medicaid recipients in the USA are ambiguous and relatively debatable because the findings are mixed and inconsistent even within one programme. However we have initial evidence of labour supply distortion caused by CHIP and Affordable Care Act. The picture outside the USA is not much clearer due to the limited number of studies. Fifth, tax subsidy seems to be a good policy tool for entrepreneurship promotion while employment-linked insurance can create "entrepreneurship lock" in the USA. General health coverage expansion which removes the link between employment and insurance seemingly boosts self-employment. Outside the USA, preliminary evidence of entrepreneurship push and entrepreneurship lock is reported but more research is recommended. Sixth, universal coverage may create both an incentive and a disincentive to work depending on the design of the system. Finally, evidence on the relationship between health insurance and the level of economic formalisation in developing countries is fragmented and limited, making it difficult to draw any definite conclusion.

Notes

1. Medicaid in the USA is a joint federal and state programme that provides low income earners with free health insurance. CHIP is an insurance programme that provides health coverage to eligible children though Medicaid and separate CHIP schemes.
2. Affordable Care Act, shorthand of the Patient Protection and Affordable Care Act, is a federal law introduced under the Obama Administration in 2010 to expand the eligibility of health insurance programmes in the USA. The aim was to improve health insurance coverage and ensure quality, affordable healthcare for all Americans. The programme is often informally referred as Obamacare.

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Appendix 1

Table AI. Papers excluded during full-text screening based on exclusion

No.	Study	Journal	Reason for exclusion
1	Bradley *et al.* (2007)	*Health Economics*	Not directly examine labour supply effect of health insurance. It rather compare labour supply effect of two different types of health insurance in the USA
2	Bradley *et al.* (2013)	*Journal of Health Economics*	Not directly examine labour supply effect of health insurance. It rather compare labour supply effect of two different types of health insurance in the USA
3	Feng and Zhao (2015)	University of Connecticut, Department of Economics Working Paper Series	Pure theoretical without empirical evidence
4	Gupta *et al.* (2015)	*Social Science and Medicine*	Not directly examine labour supply effect of health insurance. It rather compare labour supply effect of two different health systems in the USA and Denmark
5	He and White (2013)	*Medicare and Medicaid Research Review*	The paper examines the labour supply of paediatricians while the health coverage is extended for children. We consider this indirect effect and hence remove the study
6	Heim and Lurie (2013)	*Contemporary Economic Policy*	Not directly examine self-employment effect of health insurance. It rather compare the effects between tax-based subsidy for the self-employed and non-group health insurance regulations
7	Ihori *et al.* (2009)	GSIR working papers	*Ex-ante* evaluation, not empirical evidence
8	Jung and Tran (2016)	*Review of Economic Dynamics*	Pure theoretical without empirical evidence
9	Pashchenko and Porapakkarm (2016)	SSRN	Pure theoretical without empirical evidence
10	Pohl (2014)	SSRN	Pure theoretical without empirical evidence
11	Qin and Chernew (2014)	*Journal of Health Economics*	This paper does not use a proper variable for health coverage but use "state health care spending" as a proxy for that
12	Zimmer (2010)	*The Quarterly Review of Economics and Finance*	Health insurance is just a minor point, not the main variable of interest

Table AII.
Labour supply of married individuals with health insurance

Appendix 2

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample	Type of insurance	Subject of the study
1	*Research in Labour Economics*	Wellington and Cobb-Clark (2000)	–	98 reduced hours per year on average (approximately 61 hours due to a withdrawal from the labour force and 37 hours due to a reduction in the average hours worked) 6.2% decrease in labour supply for the whole US economy	USA	With and without comparison for probit; OLS	Labour force participation (binary); annual hours worked	March Current population Surveys (CPS) – cross-section	1993	16,423 households	Spousal coverage	Households where both partners are aged 25–62
2	*Journal of Public Economics*	Royalty and Abraham (2006)	–	10 (or 21) pp decrease in the probability of working full-time for women (men) 14.4 (or 19.5) pp decrease in the probability of working 20 hours or more per week for women (men)	USA	Instrumental variable for linear probability models	Working fulltime (binary)	Round 1 of household component from medical expenditure panel surveys (MEPS) in 1996, 1997 and 1998	1996–1998	6,782 households	Spousal coverage	Both married men and women in households where both partners are age between 19 and 64 and at least one partner is employed outside the home

(*continued*)

Table AII.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample	Type of insurance	Subject of the study
3	*Journal of Family and Economic Issues*	Murasko (2008)	–	7.9–18.7 pp decrease in probability of labour force participation 1.01–12.9 reduced weekly hours for those working	USA	Pooled and first differenced techniques for Tobit and linear probability models	Working (binary); weekly hours worked	Medical expenditure panel surveys (MEPS)	1996–2004	17,612 observations in a pooled sample of two waves	Spousal coverage	Women aged 25–54
4	*Forum for Health Economics and Policy*	Kapinos (2009)	–	16 pp decrease in probability of labour force participation 13–25 decrease pp in probability of working full-time	USA	Instruments for Tobit and ordered Probit	Weekly hours worked; ordered variable for not working/ part-time/ full-time	March Current population Surveys (CPS) – pooled cross-sections	1995–2005	14,949 observations	Spousal coverage	Married women
5	*Industrial Relations: A Journal of Economy and Society*	Wenger and Reynolds (2009)	– and 0	2.3 pp decrease in fulltime work for men if wives have employer provided insurance No effect on part-time job for men 3.3 pp decrease in part-time work for women if husbands have	USA	Multinomial logistic with Heckman Selection (1979) for robustness check	Six various dummies for non-standard employment	March current population survey (CPS)-pooled cross-sections	1997–2005	7,102 men and 4,948 women	Spousal insurance	Married adults aged 55–64

(*continued*)

Table AII.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample	Type of insurance	Subject of the study
				employer provided insurance No effect on fulltime work for women								
6	*Eastern Economic Journal*	Cebi and Wang (2013)	–	5.2–18.4 pp decrease in likelihood of working fulltime 0.5–9.4 pp decrease in employment likelihood 0.98–3.7 reduced work hours	USA	Cross-sectional estimates from LPM and Probit models, cross-sectional instrumental variable and panel estimates (pooled ordinary least squares, random effects, fixed effects and first differencing)	Working (binary) fulltime (binary) and work hours per week	National longitudinal survey of youth (NLSY) March 2000 Demographic supplement to current population survey (CPS)	1989–2000 from NLSY (panel) and CPS in 2000	12,822 married Women from NLSY and 19,515 women from CPS	spousal coverage	Married women aged 25–64

Note: DD, Difference-in-differences

Table AIII. Labour supply of American young adults with dependent coverage

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample	Type of insurance	Subject of the study
1	NBER WP	Antwi *et al.* (2013)	– and 0	2.0 pp decrease (5.8 % increase) in likelihood of full-time work 3% decrease in weekly work hours No effect on employment probability	USA	DD and DDD	Employment (binary); working full-time (binary); hour worked	SIPP	2008–2011	50,000 households	Affordable Care Act	young people aged 19–25
2	ILR Review	Hahn and Yang (2016)	–	3.1 pp decrease in likelihood of full-time work (2.6 pp decrease for women and 3.7 pp decrease for men) 2.1 pp decrease in employment likelihood	USA	DD	Employment status (binary), hours worked, full-time (binary)	March CPS – pooled cross-sections	2001–2010	74,417 observations	State-level extensions of dependent coverage in many states in 2010	Students aged 19–24
3	*Journal of Health Economics*	Depew (2015)	– and 0	2.65 pp decrease in likelihood of full-time work (3.7 pp decrease for women and 2.24 pp decrease for men) No effect on labour supply participation for men 1.5 pp decrease in labour supply	USA	DDD	Labour force participation rate, per cent change in hours worked, full-time employment	American Community Surveys (ACS) – Pooled CS	2001–2010	258,612 observations	Expanded dependent health insurance	Young individuals aged 19–29

(*continued*)

Table AIII.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample	Type of insurance	Subject of the study
				participation for women								
4	*American Journal of Public Health*	Dahlen (2015)	–	Aging out (dependent coverage disenrollment at the cut-off 26 years old) is associated with 7.9 pp increase in employment likelihood 9.7% increase in the labour market participation for men	USA	Regression Discontinuity	Employment likelihood; likelihood of labour force participation; likelihood of working full time	IHIS	2011–2013	10,463 individuals	Patient Protection and Affordable Care Act	Unmarried individuals aged 24–28

Notes: CPS, Current population surveys; DDD, difference-in-difference-in-difference (tripled difference); SIPP, survey of income and programme participation – panel data; IHIS, integrated health interview series – pooled cross sections

Table AIV. Labour supply effect of health insurance on people with health impairments

No.	Journal	Study	Effect Sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
1	*The Journal of Health Care Organization, Provision, and Financing*	Tunceli *et al.* (2009)	+	23.6–32.1 pp decrease in exit likelihood for men 13.9–16.9 pp decrease in exit likelihood for women 34.7–42.2 pp decrease in likelihood of job change for men 19.1–28 pp decrease in likelihood of job change for women	USA	DD	Exit rate part-time job rate	Penn State cancer Survivor Study – panel	1997–2002	1,763 (first wave) and 1,511 (second wave)	Employer provided health insurance	Cancer survivors diagnosed during 1997–1999 in 3 hospitals in Pennsylvania, aged 25–62 at diagnosis
2	*International Journal of Health Care Finance and Economics*	Page (2011)	–	10% increase in coverage amount leads to 0.8–2.3 pp decrease of employment likelihood	USA	DD with linear probability models	Labour force participation (binary)	US Renal Data System-panel	1991–1997	3,534 observations (before) 3,877 observations (after)	Medicare expansion which increases the medication for kidney transplant patients	Individuals transplanted during 1991–1997, aged 25–55
3	*International Journal of Health Care Finance and Economics*	Bradley *et al.* (2012)	+	30 pp increase in likelihood to stay in employment	USA	DD for Linear probability models	Employment status (binary)	Health and Retirement Study – panel	1996–2008	1,582 men	Own employer insurance or spousal coverage	Married, employed and insured men

Note: DD, Difference-in-differences

Table AV.
Labour supply effect of health insurance on assistance recipients

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
The introduction or expansion of Medicaid												
1	*Economic Inquiry*	Montgomery and Navin (2000)	− and 0	0–0.15 pp decrease in working probability 0–0.004 decrease in hours work per weak	USA	Probit and OLS with fixed and random effects	Labour force participation (binary); hours worked	CPS Pooled cross-sections	1980–1993	47,839 individuals	Expansions in Medicaid eligibility	Females aged 18–65 with at least one child under 15
2	Ann Arbour Journal	Yelowitz (2003)	− and 0 and +	0–7.1 pp increase in likelihood of labour force participation (due to increase in income limit) 1.7–4.2 pp decrease in likelihood of labour force participation (due to increase coverage for children)	USA	DD and DDD for Probit	Labour force participation (binary)	CPS 1987–1997 and Survey of Income and Programme Participation 1987–2000	1987–2000	146,926 married women	Medicaid expansions starting in 1988 which result in dramatic increase in Medicaid eligibility and coverage	Married women
3	*Industrial and Labor Relations Review*	Ham and Shore-Sheppard (2005)	0	Statistically insignificant on labour force participation	USA	Probit	Labour force participation (binary)	CPS Pooled cross-sections	1988–1996	36,628 individuals	Expansions of Medicaid's health insurance eligibility for single-headed families	Single mothers aged 18–55 with at least one child under 15

(*continued*)

Table AV.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
											starting in mid1980s	
4	*Journal of Health Economics*	Strumpf (2011)	0	Statistically insignificant on labour force participation	USA	DDD for Probit	Labour force participation (binary)	CPS – Pooled cross-sections	1963–1975	54,782 individuals	Introduction of Medicaid programme	Single women aged 20–50
5	*Social Work in Public Health*	Rosen (2014)	–	An increase of 6.07 work hours per week for those who are without Medical aid	USA	Multi-level regression	Hours worked per week	CPS 2011 Annual Social and Economic Supplement	2011	1,547 individuals	Medicaid and CHIP	Low income, unmarried female heads of households with children under 6
6	*American Journal of Health Economics*	Dave *et al.* (2015)	–	20 pp increase in eligibility would reduce employment likelihood by 1.7–7.2 pp	USA	Theoretical Modelling and Testing using panel data with first differencing and fixed effects techniques	Employment status (binary); Labour force participation (binary); weeks worked per year; hours worked per week	CPS Pooled cross-sections	1985–1996	22,182 to 23,043 women per wave	Medicaid expansion	Pregnant women
7	*Health Affairs*	Gooptu *et al.* (2016)	0	Statistically insignificant on employment, hours worked	USA	DD	Job loss (binary); job switching from full-time to part-time employment (binary)	CPS Pooled cross-sections	2005–2015	352,556 individuals	Medicaid	Adults with incomes below 138 per cent of the federal poverty level

(*continued*)

Table AV.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
Children's Health Insurance Program (CHIP)												
8	*Journal of Family and Economic Issues*	Tomohara and Lee (2007)	– and 0	No effect on hours worked for women in general A decrease of 2–4 work hours per week for non-white women	USA	DD	Hours worked	CPS Pooled cross-sections	1996–2002	11,241 treatment and 39,531 control observations	The enactment of the State Children's Health Insurance Program (SCHIP)in 1997	Married women (wives) in families with CHIP benefits
9	*Applied Economics*	Lee and Tomohara (2008)	– and 0	No effect in general 8–10.6 pp decrease in employment likelihood for non-white women	USA	DD for Probit	Employment status (binary)	CPS Pooled cross-sections	1996–2002	50,476 treatment and 58,544 control observations	State Children's Health Insurance Programme (SCHIP)	Women in family with SCHIP benefits
Other programs												
10	*Medical Care Research and Review*	Guy *et al.* (2012)	–	2.2 pp decrease in full-time employment 0.8 pp increase in part-time employment 1.4 increase in likelihood of not working	USA	DD for Logit and Ordered Logit	Labour force participation (ordered variable)	CPS Pooled cross-sections	1998–2008	118,587 individuals	Affordable Care Act expansions to increase public health insurance among low income people	Low income childless adults aged 19–64
11	*The Quarterly*	Garthwaite *et al.* (2014)	–	0.3–0.6 pp decrease in aggregate	USA	DD and triple difference models	State-year employment rate	CPS Pooled cross-sections	2000–2007	A subsample out of 50,000	Tennessee's health care reform that	People aged 21–64 without an

(*continued*)

Table AV.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
	Journal of Economics			employment rate (or an immediate increase in labour supply due to disenrollment)						households in CPS	leads to large disenrollment	advanced degree
12	*Health Affairs*	Moriya *et al.* (2016)	0	Statistically insignificant effect on part-time employment	USA	Fixed effects regressions for pooled cross-sections	Weekly hour work	CPS Pooled cross-sections	2005–2015	4,847,744 observations	Affordable Care Act	Individuals aged 19–64
13	*American Economic Journal: Economic Policy*	Dague *et al.* (2017)	–	2.4–10.6 pp decrease in employment likelihood	USA	Regression Discontinuity and Propensity Score Matching combined with DD	Employment probability	State administration records in labour Panel	2005–2011	14,513 individuals	Wisconsin's Badger Care Plus Core Plan. This provided health insurance to childless adults	Non-elderly, non-disabled adults without dependent children ("childless adults")
14	*Journal of Public Economics*	Bèrgolo and Cruces (2014)	+	1.6 pp increase in benefit eligible registered employment	Uruguay	DD for OLS	Benefit-eligible employment; registered employment; unregistered employment; benefit-eligible employment; unemployed	Micro data from ECH survey- a pool of cross-sections	2004–2010	97,552 individuals	A healthcare reform in Uruguay that extended coverage to the dependent children of registered private sector workers	Urban adults aged 25–55

Notes: DD, Difference-in-differences; DDD, difference-in-difference-in-difference; CPS, March current population surveys. This is a pool of cross-sections

No	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
1	*Journal of Health Economics*	Chou and Staiger (2001)	–	4 pp decrease in employment probability of married women	Taiwan	Probit regression	working (binary)	SFIE: A series of cross-sections	1979–1985 and 1992–1997	34,233 women in 1979–1985 and 27,753 women in 1992–1997	NHI in 1995	Married women
2	NBER WP	Chou *et al.* (2002)	0	Statistically insignificant effect on labour supply of married women	Taiwan	OLS, DD for Probit and instrumental Probit in a natural experiment	Spousal employment (binary)	SFIE: A series of cross-sections	1993–1999	50,423 households	NHI in 1995	Married women in households where the head is employed and aged 20–65
3	*Journal of Population Economics*	Kan and Lin (2009)	–	A decrease of 2 work hours per week for private sector employees	Taiwan	DD and ratio-of-ratios with log-linear models	Hours worked	Manpower utilisation Survey (MUS) in Taiwan – pooled cross-sections	1992–1996	78,628 individuals	NHI in 1995	Individuals aged 26–59, employed in private or public sector
4	*Health Care for Women International*	Liao (2011)	–and 0	17.8–21.7 pp reduction in labour force participation of married women in the second income quartile No significant effect for other income groups	Taiwan	DD and DDD	Labour force participation	Survey of Family Income and Expenditure (SFIE)	1994–1996	Married women in 4,720 households (before) and 3,771 households (after)	NHI in 1995	Married women with husbands who have government (treatment) or non-government jobs (control)

(*continued*)

Table AVI.
Labour supply effects of universal health coverage

Table AVI.

No	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
5	World Bank Policy Research Working Paper	Wagstaff and Manachotphong (2012)	+	3.3–7 pp increase in employment for single men 2.3–7.5 pp increase for single women 6.1–11.6 pp increase for married women	Thailand	Panel data techniques	Employment likelihood (binary); categorical variable for type of employment	Thailand's Labor Force Survey-panel	1997–2005	4.7 million individuals	Thai Universal Health Coverage in 2001	individuals over 15 years old

Notes: DD, Difference-in-differences; DDD, difference-in-difference-in-differences; NHI, expansion of National Health Insurance in Taiwan into universal health insurance 1995; SFIE, survey of family income and expenditure

Table AVII.
Isolated papers on labour supply effect of health insurance

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
1	*Industrial and Labor Relations Review*	Kaestnerand Simon (2002)	+ and 0	No effect on week of work 0.4–0.7 increase in hour per week for employees in medium firms	USA	Multi-level analysis	Hours worked per week, weeks worked per year	CPS – pooled cross-sections	1989–1998	80,679 observations	Employer-sponsored health insurance reform	People aged 18–54, used to be employed excluding self-employment
2	*Journal of Health Politics, Policy and Law*	Wolaver *et al.* (2003)	–	0.8–5.4 pp decrease in full-time employment for low wage workers	USA	Multinomial logistic regression	Multinomial variable[a]	1988 and 1993 Employee Benefits Supplements to the CPS	1988–1993	3,045 individuals	Employment-tied health insurance	Working individuals, not very well specified
3	*The American Economic Review*	Baicker and Chandra (2005)	–	8% decrease in full-time work 6% decrease in employment (associated with 40% increase in premium)	USA	Instrumental regressions	State level hours worked; part-time/fulltime share	Kaiser Family Foundation Survey 1996–2001; CPS 1996–2002, National practitioner data bank	1996–2002	284 states	Rising health insurance premiums	Working age people
4	*Journal of Labour Economics*	Baicker and Chandra (2006)	–	1.2 pp decrease in aggregate employment probability 2.4% decrease in hour worked 1.9 pp increase in	USA	Instrumental OLS	hours worked; unemployment part-time/fulltime share	Medical Expenditure panel Surveys (MEPS) combined with March CPS	1996–2002	194,739 for 1996–1999 and 151,785 for 2000–2002	Rising health insurance premiums	Individuals aged 22–64

(*continued*)

Table AVII.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
				likelihood of part-time work (associated with a 10% increase in health insurance premiums)								
5	World Bank Policy Research Working Paper	Wagstaff and Moreno-Serra (2007)	–	100% increase in			unemployment rate 6.7–10 pp decrease in employment-to-population ratio	Central Asia	DD and	instrument variables		
							Unemployment rate, employment rate, informality share	Panel data from 28 Central Asia countries compiled from many sources	1990–2004	28 countries	Transition to social health insurance in Central Asia	Individuals aged 15–59
6	A book chapter	Wagstaff and Moreno-Serra (2015)	–	10% decrease in employment	EE and CA	DD with instruments	Employment, unemployment, self-employment rates, size of informal economy by GDP contribution	A combination of many databases Panel	1990–2004	28 countries		Individuals aged 15–59
7	*Journal of Public Economics*	Boyle and Lahey (2010)	–	2.7–3.33% more likely not working as a result of gaining coverage	USA	DD for Probit	employment status (binary), self-employment and part-time (binary)	March CPS	1992–2002	18,210 veterans, 19,769 non-veterans	Expansion of health insurance for non-poor, non-disabled veterans	Male veterans aged 55–64

(*continued*)

Table AVII.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
8	*Journal of Health Economics*	Boyle and Lahey (2016)	+ and −	1–2 pp increase in employment likelihood for women if their husbands receive veterans affairs insurance 0.75 pp decrease in employment likelihood for male veterans 1.46 pp decrease in likelihood of working part-time for male veterans	USA	DD	Not working (binary) hours worked last week working part-time (binary) self-employment (binary)	March CPS	1992–2002	19,680 veterans, 20,838 non-veterans	Veterans affairs expansion	Senior married couples aged 55–64

Notes: DD, Difference-in-difference; DDD, difference-in-difference-in-difference; CPS, March current population surveys. This is a pool of cross-sections. [a]Multinomial variable: 0 working fulltime with health coverage; 1 working fulltime without health coverage; 2 part-time with health coverage; 3 part-time without health coverage

Table AVIII.
Health insurance and self-employment

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
Tax subsidy or tax deductibility to reduce premiums for informal workers												
1	*Journal of Public Economics*	Heim and Lurie (2010)	+	1.5 pp increase in self-employment likelihood 0.8 pp increase in self-employment entry 2.8 pp decrease in exit	USA	Fixed effects instrumental variable regression	Probability of being self-employed, probability of self-employment entry, probability of self-employment exit	Edited Panel of Tax returns	1999–2004	236,878 observations from 48,396 individuals	Tax Reform Act 1986	Prime age individuals aged 25–64
2	*Contemporary Economic Policy*	Gurley-Calvez (2011)	+	7.4% decrease in self-employment exit is associated with tax deductibility for health insurance	USA	Probit and IV Probit	Probability of self-employment exit	University of Michigan Tax Research Database on tax return. Panel data	1988–1990	1,186 single and, 3,381 married observations	Self-employment Contributions Act 1987	Tax payers
3	*Contemporary Economic Policy*	Velamuri (2012)	+	34–56% increase in self-employment for single and married women 10% increase in self-employment for single	USA	DD for Probit; Multinomial Logit	Change in self-employment share, self-employment (dummy)	March CPS	1985–1991	85,264 observations	Tax Reform Act 1986	Women aged 18–64

(*continued*)

Table AVIII.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
				women relative to married women								
4	*Journal of Business Venturing*	Gumus and Regan (2015)	+	8.1% increase in entry into self-employment for men 24.4% increase in entry for single men 11.2% decrease in exit rate	USA	DD for Probit	Probability of switching from salaried job to self-employment (entry); probability of switching from self-employment to salaried job (exit)	March CPS	1996–2007	70,847 observations	Spousal coverage and Tax Reform Act 1986	Prime age men aged 25–60
Spousal coverage												
5	*Contemporary Economic Policy*	Wellington (2001)	+	2.3–4.4 pp increase in self-employment likelihood for husbands who get coverage via their spouse's employers 1.2–4.6 4 pp increase in self-employment likelihood for wives who get coverage via their	USA	Empirical modelling and empirical testing which uses different approaches for comparison: Logit models and DD	Self-employment status (binary)	March 1993 Annual Demographic File of CPS	1993	16,748 employed husbands and 13,356 employed wives	Spousal coverage	Non-disabled employed married white individuals aged 25–62

(*continued*)

Table AVIII.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
				spouse's employers								
6	*Journal of Small Business Management*	Gai and Minniti (2015)	+ and −	0.5–2 pp increase in the likelihood of self-employment of the other spouse if a spouse is health insurance holder 1.74–2.09 pp decrease in the likelihood of switching to self-employment of the policy holder	USA	DD for Probit	Self-employment (binary)	Medical Expenditure Panel Survey	2000–2008	15,839 observations	Spousal coverage	Married working individuals aged 18–62
Employer provided health insurance												
7	*Labour Economics*	Zissimopoulos and Karoly (2007)	−	0.7 pp decrease in self-employment likelihood for salary men 0.1 pp decrease in self-employment likelihood for salary women	USA	Multinomial logit model	Different dummies: transition from full-time salaried work to self-employment retirement or to another not working state (unemployed, disabled, not in the labour force)	Health and Retirement Study Panel	1992–2000	34,920 observations	Employer provided retirement health insurance; employer provided health insurance	Individuals aged 51–69

(*continued*)

Table AVIII.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
8	*Journal of Health Economics*	Fairlie *et al.* (2011)	−	0.013 pp increase in business ownership rate for those at 65 years old (the threshold of aging-out) Not significant effect just before or after others groups aged 55–75	USA	DD for Probit, Discontinuity	Probability of moving from a wage job to self-employment (binary) probability of starting a business at age 65 (binary variable for Discontinuity Design)	Annual Demographic File of March CPS	1996–2006	160,000 observations	Employer-provided health insurance	Wage salary workers
Dependent coverage												
9	SSRN WP	Bailey (2017)	0	Statistically insignificant	USA	DD for Probit, Logit and LPM accompanied by placebo tests	Self-employment (binary)	IPUMS from American Community Survey-Pooled CS	2000–2013	66,000 observations	Affordable Care Act's dependent coverage mandate 2010	Young adults self employed people aged 19–25
10	SSRN	Jia (2014)	+ and 0	No impact on entry decision for serious start-ups 2.3–3.6 pp increase in the likelihood of self-employment entry	USA	Probit, Poisson regression with endogenous treatment effects, and binary choice models by Dong and Lewbel (2012)	Self-employment entry (binary)	National Longitudinal Survey of Youth (NLSY)	2005–2011	4,400–4,800 observations per year	Employer-provided health insurance; dependent coverage	Individuals aged 21–32

(*continued*)

Table AVIII.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
Others												
11	SSRN WP/ ECONSTOR WP	DeCicca (2007)	+	1.1–1.5 pp increase in self-employment likelihood	USA	DD	Self-employment (binary)	BRFSS Pooled CS	1991–1996	382,670 observations	New Jersey's Individual Health Coverage Plan 1993	Adults aged 25–59
12	*ILR Review*	Niu (2014)	+	0.71 pp increase in self-employment likelihood	USA	DD	Self-employment status (binary)	March CPS pooled cross-sections	1995–2011	1,312,737 observations	Massachusetts Health Care Reform 2006	Individuals aged 25–54
13	The Federal Reserve Bank of Kansas City, Research Working Papers	Becker and Tuzemen (2014)	+	0.5–0.8 pp increase in the share of self-employment in total employment 0.3–0.6 pp increase in share of total self-employment in total working age population	USA	DD and synthetic control method	Share of self-employment in total employment; share of self-employment in working-age population (state level)	CPS and Annual Social and Economic Supplement (ASEC)-Pooled CS	1994–2012	11,424 observations	Massachusetts Health Care Reform Act of 2006 to reduce un-insurance in the state	Working age individuals aged 16–64, not employed in agriculture and military
14	SSRN	Chavda (2015)	0	Statistically insignificant	USA	DD	Yearly percentage change in share of self-employment (county level)	American Community Surveys (ACS) combined with Non-employer Statistics	2000–2012	804 counties	Massachusetts Health Care Reform Act of 2006	Self-employed individuals

(*continued*)

Table AVIII.

No.	Journal	Study	Effect sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
15	A book chapter	Wagstaff and Moreno-Serra (2015)	+	17% increase in self-employment	EE and CA	DD with instruments	Employment, unemployment, self-employment rates, size of informal economy by GDP contribution	from US Census A combination of many databases Panel	1990–2004	28 countries	Social Health Insurance	Individuals aged 15–59
16	ECONSTOR WP	Fossen and König (2017)	–	0.38 pp decrease in entry into self-employment (associated with an increase of 100 Euro in monthly premium)	Germany	Hazard rate model with sample selection	Probability of entry into self-employment (binary)	German Social Economic – Panel	2000–2012	20,000 individuals in 11,000 households	Public health insurance	Individuals aged 19–59

Notes: DD, Difference-in-difference; DDD, difference-in-difference-in-difference; CPS, March current population surveys. This is a pool of cross-sections; pp, percentage point; Tax Reform Act 1986 that introduce tax subsidy for the self-employed to purchase their own health insurance; Self-employment Contributions Act 1987 allows full deductibility for the self-employed; IPUMS, integrated public use micro data series; EE and CA, Eastern Europe and Central Asia; BRFSS, behavioural risk factor surveillance system

Table AIX.
Health insurance and economic formalisation

No.	Journal	Study	Sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
USA												
1	*Journal of Agriculture and Resource Economics*	Ahearn *et al.* (2013)	(+) Formality	19 pp increase in off-farm employment likelihood	USA	2 stage simultaneous Probit model	whether to work off-farm (binary)	2010 Agricultural resource Management Survey Cross-section	2010	3,025 farm households	Employer provided health insurance	farm households with farm operator younger than 65
Non-USA												
2	*Journal of Agricultural and Resource Economics*	Liao and Taylor (2010)	(–) Formality	9.6–13.6 pp decrease in off-farm labour force participation of wives	Taiwan	DD and DDD for Probit	off-farm employment (binary)	Survey of Family Income and Expenditure (SFIE). A series of cross-sections	1992–1997	Wives in 7,809 households	Universal National Health Insurance (NHI) 1995	Wives in farm households
3	WB Working Paper	Aterido *et al.* (2011)	(–) Formality	3.1 pp decrease (a 20 % decline) in entry into formality	Mexico	DD in multilevel analysis	Probability of working in formal sector for both individual and household level	National Employment Survey (nationally representative), panel	2000–2009	10 million individuals aged 15–65, around 100,000 households per period	Seguro Popular', a non-contributory health programme for informal households	Households who are uncovered with health insurance before
4	World Bank Policy Research Working Paper	Wagstaff and Manachotphong (2012)	(–) Formality for men (+) Informality for all	3 pp decrease in formal employment for men 5.8–10.2 pp increase in informal employment for single men 4–7.4 pp increase for married men; 4.6–8.2 pp	Thailand	Panel data techniques	employment likelihood (binary) categorical variable for type of employment	Thailand's Labour Force Survey-panel	1997–2005	4.7 million individuals	Thai Universal Health Coverage in 2001	individuals over 15 years old

(*continued*)

Table AIX.

No.	Journal	Study	Sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
				increase for single women 6.7–12.5 pp increase for married women								
5	*Journal of Health Economics*	Azuara and Marinescu (2013)	Insignificant	Insignificant on informality	Mexico	Theoretical Modelling and testing using linear probability models	informal employment status (binary)	Four sets of data: census data for the total population and households, labour surveys, and the roll-out information of Progresa-Oportunidades and Seguro Popular	1995–2009	1,043,323 observations	Seguro Popular', a non-contributory health programme for informal households	Urban individuals
6	*Economía Mexicana*	Campos-Vazquez and Knox (2013)	Insignificant	Insignificant on informality	Mexico	DD	Probability of moving from formal to informal sector (binary)	Labour Force Survey combined with individual-level Oportunidades data set	2001–2004	28,675 individuals aged 15–65	Mexicoís Seguro Popular Programme providing free or subsidised health insurance coverage to 47 million uninsured people by 2013	Working age people in big cities in Mexico
7	*American Economic Journal: Economic Policy*	Bosch and Campos-Vazquez (2014)	(–) Formality	Decrease of 0.8% (after the implementation) to 4.6% (after 4 years of the policy) in	Mexico	DD	Log total formal employment registration	Administrative data from the Mexican Institute of Social Security (IMSS) merged	2000–2011	65,424 observations	Seguro Popular', which provides free health insurance to	Formal employers

(*continued*)

Table AIX.

No.	Journal	Study	Sign	Effect magnitude	Country	Methodology	Outcome variables	Data	Period	Sample size	Type of insurance	Subject of the study
				number of formal SME enterprises				with 2000 Population census			informal households	
8	*The World Bank Economic Review*	Camacho *et al.* (2013)	(+) Informality	4 pp increase in informal employment	Colombia	Fixed effects for Probit model	Informal employment status (binary)	Colombian Household Surveys – pooled cross sections and SISBEN interviews	1990–2005	66,951,730 observations	Subsidised Regime- non-contributory health insurance for the poor under Universal health coverage in the 1990s	Eligible households for Subsidised Regime
9	World Bank Policy Research Working Paper	Wagstaff and Moreno-Serra (2007)	Insignificant	Insignificant on Informality	Central Asia	DD and instrument variables	Unemployment rate, employment rate, informality share	Panel data from 28 Central Asia countries which are compiled from many sources	1990–2004	28 countries	Transition to social health insurance in Central Asia	Individuals aged 15–59
10	A book chapter from "Social Insurance, Informality, and Labour Markets: How to Protect Workers While Creating Good Jobs". Oxford University Press	Bérgolo and Cruces (2014)	(+) Formality	1.3 pp increase in likelihood to switch from informal to formal employment	Uruguay	DD	Informal employment status (binary)	Household survey micro data from the Encuesta Continua de Hogares (ECH)-pooled cross sections	2001–2009	67,479 (before) and 16,630 (after) observations	Healthcare Reform 2008 in Uruguay which extended coverage to registered workers' children	Adults aged 19–60, who work in registered private sector

Notes: DD, Difference-in-difference; DDD, difference-in-difference-in-difference; CPS, March current population surveys. This is a pool of cross-sections; pp, percentage point

Appendix 10. Databases' coverage and their pros and cons

This Annex provides information on coverage as well as pros and cons of three main databases used for the search, i.e. Web of Science, Google Scholar, Pubmed. This is to justify our choice of databases employed.

Web of Science (WoS) has been for long considered by bibliometrics researchers as one of the main sources of sciences, social science, arts and humanities literature and hence been used widely in bibliometric analysis (Franceschet, 2009). The site is an online academic database presently owned by Thomson Reuters. On its website, Web of Science self-claims to integrate other important databases such as Elsevier's ScienceDirect, JSTOR, and MEDLINE and many other non-English databases like Chinese Science Citation Database, KCI Korean Journal Database and SciELO Citation Index which covers Brazil, Spain, Portugal, the Caribbean and South Africa, and more 12 countries of Latin America. This database however is limited to journal publications and hence excludes other forms of writings like books, conference papers, and so on.

As a growing alternative source for WoS, Google Scholar is increasingly become widely used as it covers various sorts of information rather than journal papers like conference proceedings, theses, reports, working papers, books and book chapters (ibid.). Besides vast coverage, free and easy access is another big advantage of this Google gadget although how and from which sources this database is built up is unknown to the public (Norris and Oppenheim, 2007). The inclusion of Google Scholar besides WoS is to ensure that we do not miss out on non-journal studies (e.g. working papers, book chapters). We also include working paper sources (NBER, ECONSTOR, IDEAS, IZA, SSRN, World Bank Working Paper Series) to make an extensive reach of the search.

Finally, Pubmed is a frequently used source for medical literature search. It is a service of American National Library of Medicine that provides "free access to MEDLINE, the NLM database of indexed citations and abstracts to medical, nursing, dental, veterinary, health care, and preclinical sciences journal articles" (PubMed FAQ on PubMed website, 2015). Plus, PubMed can be viewed as a parent set of MEDLINE as it also includes additional selected life sciences journals not in MEDLINE. The inclusion of PubMed in addition to Web of Science, which is as aforementioned comprised of MEDLINE, is thus to ensure that we would not miss anything on medical literature.

Appendix 11

Table AX. Key terms used in the search

No.	Dependent variable	No.	Independent variable
Labour supply			
1	Labour market effects	1	Health insurance
2	Labour supply	2	Healthcare
3	Work incentive	3	Health coverage
4	Hours work	4	Medical coverage
5	Labour force participation	5	Medical aid
Informality of the economy			
1	Formality		
2	Formal sector employment		
3	Informality		
4	Informal sector secsector employment		
Self-employment			
1	Self employment		
2	Entrepreneurship		

Corresponding author
Nga Le can be contacted at: nga.le@maastrichtuniversity.nl