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**Effects of health insurance on labour supply: A systematic review**  
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# EFFECTS OF HEALTH INSURANCE ON LABOUR SUPPLY

## A SYSTEMATIC REVIEW

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## **ABSTRACT**

This study provides a systematic review of empirical evidence on the labour supply effects of health insurance. The outcomes in the 63 studies reviewed include labour supply in terms of hours worked and the probability of employment, self-employment and the level of economic formalisation. One of the key findings is that the current literature is vastly concentrated on the US. We show that spousal coverage in the US is associated with reduced labour supply of secondary earners. The effect of Medicaid in the US on labour supply of its recipients is ambiguous. However we have initial evidence of labour supply distortion caused by Children's Health Insurance Program, Affordable Care Act and other public health insurance expansions. A tentative result is that dependent young adults in the US who can access health insurance via their parents' employer have lower labour supply through fewer hours worked while keeping the same employment probability. The employment-coverage link is an important determinant of labour supply of people with health problems. The same holds for 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.

**Key words:** health insurance, labour supply, self-employment, economic informality, systematic review

# 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 employment (Wagstaff and Moreno-Serra, 2007; 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 tied to employment, may make working less attractive because of a consumption smoothing effect resulting from the removal of unexpected catastrophic health expenses (Chou & Staiger, 2001). Similarly, the precautionary labour theory developed by Netzer and Scheuer (2007) suggests that individuals who are faced with less uncertainty will decrease their work hour. This implies that more security in health coverage potentially lowers labour supply.

However, empirical evidence of the labour supply effects of health insurance has not been thoroughly reviewed. The results of previous reviews (Gruber and Madrian, 2002; and Madrian, 2006) as well as book chapters (Currie and Madrian, 1999; Gruber, 2000) cannot be generalised due to their mere focus on the American healthcare system with its rather unique insurance-employment tie. 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 effects of health insurance on labour supply all over the world. This would be of particular help to better inform policy makers in developing countries given the current interest in expanding health coverage (Cotlear, 2015). Because of the diversity in healthcare coverage and support, the concept of 'health insurance' in this review concerns different types: employment-provided health insurance (which is dominant in the US and consists of various schemes such as dependent coverage, spousal and employee packages); public health insurance for social assistance recipients; universal health coverage; tax

and price subsidies to make health insurance cheaper and more accessible; and any other less-known public schemes. The outcomes reviewed in this paper include labour force participation, number of hours worked, self-employment decision, and work in the informal sector.

Our study is conducted systematically, covering the largest databases for economics and health-related studies as well as economics working papers. The search protocol and procedure are recorded and provided for the transparency and accountability of this review. We also follow the PRISMA 2009 protocol (2009) for systematic reviews.

## **2. METHODS**

### **2.1 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, CEPR, SSRN, World Bank Working Paper Series. The rationale for database selection following standards set in PRISMA 2009 Checklist (2009) is presented in Annex 1. This review includes publications released after 2000 and written in English.

### **2.2 Search methods**

The search was implemented step by step along with a search diary and a check-list of key terms used (listed in Annex 2). We combined each of the two key words representing dependent (labour supply) and independent (health insurance) variables in the advanced search field, if any available, with colophon 'AND', and set search locations in all fields (namely, title, abstract and content).

The search in Web of Science, Pubmed databases and the working paper sources, with more advanced and well organised search functions, normally result in a compact amount of results

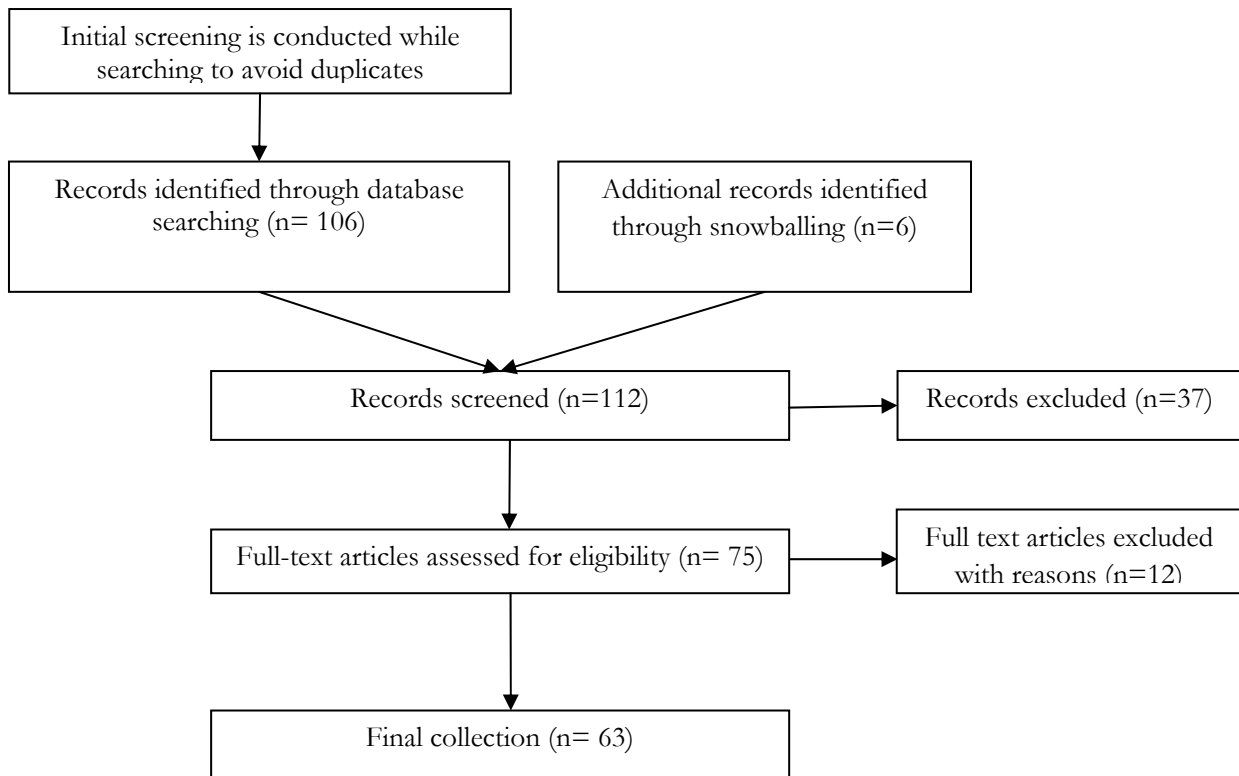
which are then completely scanned through. In contrast, Google Scholar often presents an extremely high number of references with irrelevant records listed at the bottom. Therefore, screening search results on this source is stopped whenever we observe a high degree of content irrelevance. We also use a file-naming protocol to automatically 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) as we also do initial screening before saving. Our search is carried out from October 2015 to January 2016.

After the initial search, we remove duplicates, if any missed out on during the initial screening, and then carry out snowballing where we only add six working papers published in less well-known working paper series. This small number of additional papers suggests a relatively high level of accuracy and reliability of the search.

### **2.3 Study selection and exclusion criteria**

We deliberately do not set any quality filter to avoid publication bias. 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 details on the methodology of each reference reviewed are provided in the Appendix. 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 i) ex-ante evaluations and simulations and ii) purely theoretical articles. Additionally, 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. Diagram 1 summarises the whole search and screening process based on PRISMA 2009 Flow Diagram (2009). The final selection consists of 63 papers and articles.

**Diagram 1: Study selection process**



Note: 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.

### **3. THEORETICAL PREDICTIONS**

Existing literature mostly uses a theory of static labour supply which predicts that non-contributory 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 & Staiger, 2001). The effect however depends on the share of health expenses in total household expense (ibid.). Similarly, the precautionary labour theory developed by Netzer and Scheuer (2007) suggests that individuals who are faced with less uncertainty will decrease their labour supply. The authors argue that an increase in insurance coverage, and hence security, has the same effect as an increase in income which then decreases labour supply because leisure is a normal good (ibid.). These two theories are consistent in



predicting a negative effect on labour supply of health insurance as they both predict an income effect of increased health coverage.

On the other hand, the third school of thought emphasises a positive effect of health insurance on health outcomes which intuitively make beneficiaries healthier, 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. It however provides another impact channel where the labour supply effect of health insurance is positive. Nevertheless this is a mere intuitive argument without modelling ground and empirical support.

## **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 on the relationship between health insurance and labour supply, or between social insurance/social assistance and labour supply are predominantly from the US. 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 US, 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 1: Summary of the final collection**

<b>Total</b>	<b>63</b>
<b>Topic</b>	66 <sup>1</sup>
Labour supply (Labour force participation; hours worked)	40
Self-employment	16
Formality	10
<b>Methodology</b>	
Experimental	0
Quasi-experimental	47
Non experimental	16
<b>Where</b>	
US	47
Non- US	16
<b>Type of insurance/policy changes</b>	
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	4
Rising premiums	2
Universal coverage	12
Other reforms that expand coverage	10

<sup>1</sup>There are three double-counting cases, one paper looks at labour supply and self-employment, the other two examine labour supply and informality.

In sub-sections 4.2- 4.4, we respectively discuss the three labour supply 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 US given the uniqueness of the American health insurance system. Additionally, we categorise the collected studies by experimental, quasi-experimental and non-experimental based 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, difference-in-differences design and fixed effects analyses of panel data.

## 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 2 (for detailed information, see Appendix 2) and no non-US publication on the effect of health care coverage on labour supply of secondary income earners.

**Table 2: Labour supply effect of spousal coverage**

No.	Study	Sign	Effect magnitude	Methodology	Insurance	Country
<b>Employer - provided spousal coverage</b>						
1	Wellington & Cobb-Clark (2000)	-	<ul style="list-style-type: none"> <li>▪ 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)</li> <li>▪ 6.2% decrease in labour supply for the whole US economy</li> </ul>	N	SC	US
2	Royalty & Abraham (2006)	-	<ul style="list-style-type: none"> <li>▪ 10 and 21 pp decrease in the probability of working full-time for women and men respectively;</li> <li>▪ 14.4 and 19.5 pp decrease in the probability of working 20 hours or more per week for women and men respectively;</li> </ul>	Q	SC	US
3	Murasko (2008)	-	<ul style="list-style-type: none"> <li>▪ 7.9-18.7 pp decrease in probability of labour force participation</li> <li>▪ 1.01-12.9 reduced weekly hours for those working</li> </ul>	N	SC	US
4	Kapinos (2009)	-	<ul style="list-style-type: none"> <li>▪ 16pp decrease in probability of labour force participation</li> <li>▪ 13-25 decrease pp in probability of working full-time</li> </ul>	Q	SC	US
5	Wenger & Reynolds (2009)	- and 0	<ul style="list-style-type: none"> <li>▪ 2.3 pp decrease in fulltime work for men if wives have employer provided insurance;</li> <li>▪ No effect on part-time job for men</li> <li>▪ 3.3pp decrease in part-time work for women if husbands have employer provided insurance;</li> <li>▪ No effect on fulltime work for women</li> </ul>	Q	SC	US
6	Cebi & Wang (2013)	-	<ul style="list-style-type: none"> <li>▪ 5.2-18.4 pp decrease in likelihood of working fulltime;</li> <li>▪ 0.5-9.4pp decrease in employment likelihood</li> <li>▪ 0.98-3.7 reduced work hours</li> </ul>	Q	SC	US

pp: percentage point

Value '0' in the sign section means statistically insignificant

SC: Spousal coverage in the US

Methodology: N :Non-experimental; Q: Quasi-experimental

As indicated in Table 2, 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 US in term of decreases in employment likelihood (Murasko, 2008; Kapinos, 2009; Cebi & Wang, 2013), probability of working full-time (Royalty & Abraham, 2006; Kapinos, 2009; Wenger & Reynolds, 2009; Cebi & Wang, 2013) and work hours (Wellington & Cobb-Clark, 2000; Murasko, 2008; Cebi & Wang, 2013). However the effects appear to become much smaller after controlling for unobserved heterogeneity (Cebi & Wang, 2013).

#### *Dependent coverage and labour supply of young adults*

Table 3 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 US. According to Table 3, 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., 2012; Depew, 2015) but the likelihood of working full-time is reduced (Antwi et al., 2012; Hahn and Yang, 2013; Depew, 2015). From another perspective, disenrollment at the age cut-off of 25 seemingly urges young adults in the US 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.

**Table 3: Labour supply effect of dependent coverage**

No.	Study	Sign	Effect magnitude	Methodology	Country
1	Antwi et al. (2012)	- and 0	<ul style="list-style-type: none"> <li>▪ 2.0 pp decrease (5.8 % increase) in likelihood of full-time work</li> <li>▪ 3% decrease in weekly work hours</li> <li>▪ No effect on employment probability</li> </ul>	Q	US
2	Hahn & Yang (2013)	-	<ul style="list-style-type: none"> <li>▪ 3.1 pp decrease in likelihood of full-time work (2.6 pp decrease for women and 3.7 pp decrease for men)</li> <li>▪ 2.1 pp decrease in employment likelihood</li> </ul>	Q	US
3	Depew (2015)	- and 0	<ul style="list-style-type: none"> <li>▪ 2.65 pp decrease in likelihood of full-time work (3.7 pp decrease for women and 2.24 pp decrease for men)</li> <li>▪ No effect on labour supply participation for men</li> <li>▪ 1.5 pp decrease in labour supply participation for women</li> </ul>	Q	US
4	Dahlen (2015)	-	<p>aging out (dependent coverage <b>disenrollment</b> at the cut-off 26 years old) is associated with</p> <ul style="list-style-type: none"> <li>▪ 7.9 pp increase in employment likelihood;</li> <li>▪ and 9.7% increase in the labour market participation for men</li> </ul>	Q	US

Q: Quasi-experimental; pp: percentage point

Value '0' in the sign section means statistically insignificant

*Health insurance and labour supply of people with health impairments*

**Table 4: Health insurance and labour supply of people with health impairments**

No.	Study	Sign	Effect magnitude	Methodology	Country
1	Tunceli et al. (2009).	+	<ul style="list-style-type: none"> <li>▪ 23.6 -32.1 pp decrease in exit likelihood for men</li> <li>▪ 13.9 -16.9 pp decrease in exit likelihood for women</li> <li>▪ 34.7 - 42.2 pp decrease in likelihood of job change for men</li> <li>▪ 19.1- 28 pp decrease in likelihood of job change for women</li> </ul>	Q	US
2	Page (2011).	-	<ul style="list-style-type: none"> <li>▪ 10% increase in coverage amount leads to 0.8-2.3 pp decrease of employment likelihood</li> </ul>	Q	US
3	Bradley et al. (2012).	+	<ul style="list-style-type: none"> <li>▪ 30 p.p increase in likelihood to stay in employment</li> </ul>	Q	US

Q: Quasi-experimental

Table 4 summarises the results of three papers from the US 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 tie between health coverage and employment. Employment-tied health insurance tends to keep them to stay 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 heavily depend 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 5 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 US and investigate health assistance schemes such as Medicaid or Children's Health Insurance Program (CHIP) or state-level health insurance interventions.

The US-based evidence is mixed, with five negative, four statistically insignificant and four mixed results (see Table 5). The negative signs are theoretically expected, yet the statistically insignificant results are unexpected and surprising given the importance of health insurance for these low-income groups. Interestingly, if zooming in into individual program, we see that the results are

ambiguous even within the same program. For instance, the labour supply effect of Medicaid introduction and expansion is negative (Rosen, 2014; Dave et al., 2015), insignificant (Ham & Shore-Sheppard, 2005; Strumpf, 2011; Gooptu et al., 2016) or both (Montgomery & Navin, 2000; Yelowitz, 2003). Notably, these studies use the same data source (Current Population Survey), share rather similar method - almost all of them combine different methods such as DD or DDD or panel techniques with one exemption paper by Ham & 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 the fact 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 & Shore-Sheppard, 2005; Rosen, 2014), women with dependents irrespective of marital status (Montgomery & 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 Children's Health Insurance Program (CHIP) on the labour supply of women is mixed on average (Tomohara & Lee, 2007 and Lee & Tomohara, 2008). However, when looking closely into the demographics, we have initial evidence that non-white women tend to work less hours (Tomohara & Lee, 2007) or reduce labour participation (Lee & Tomohara, 2008) while the effect for white women are statistically insignificant (Tomohara & Lee, 2007 and Lee & Tomohara, 2008). Here it is explained by the authors that non-white married women tend to reduce labour supply just to make their children qualified for the benefits.

Besides Medicaid and CHIP, Affordable Care Act and other state-level expansions of public health schemes tend to create a disincentive to work to less educated adults (Garthwaite et al., 2013) and low-income and childless adults (Guy et al, 2012; Dague et al. 2014). These, consistent

with theoretical predictions, imply sizable labour supply distortion of public health insurance expansions to low-income adults (Guy, 2012; Garthwaite et al., 2013; Dague, 2014).

**Table 5: Health insurance and labour supply of assistance recipients**

No.	Study	Sign	Effect magnitude	Methodology	Country
<b>US</b>					
<b>The introduction or expansion of Medicaid</b>					
1	Montgomery & Navin (2000)	- and 0	<ul style="list-style-type: none"> <li>▪ 0-0.15 pp decrease in working probability;</li> <li>▪ 0-0.004 decrease in hours work per week</li> </ul>	Q	US
2	Yelowitz (2003)	- and 0 and +	<ul style="list-style-type: none"> <li>▪ 0- 7.1 pp increase in likelihood of labour force participation (due to increase in income limit)</li> <li>▪ 1.7-4.2 pp decrease in likelihood of labour force participation (due to increase coverage for children)</li> </ul>	Q	US
3	Ham & Shore-Sheppard (2005)	0	<ul style="list-style-type: none"> <li>▪ Statistically insignificant</li> </ul>	N	US
4	Strumpf (2011).	0	<ul style="list-style-type: none"> <li>▪ Statistically insignificant</li> </ul>	Q	US
5	Rosen (2014)	-	<ul style="list-style-type: none"> <li>▪ An increase of 6.07 work hours per week for those who are without Medical aid</li> </ul>	N	US
6	Dave et al. (2015)	-	<ul style="list-style-type: none"> <li>▪ 20 pp increase in eligibility would reduce employment likelihood by 1.7-7.2 pp</li> </ul>	Q	US
7	Gooptu et al.(2016)	0	<ul style="list-style-type: none"> <li>▪ Statistically insignificant</li> </ul>	Q	US
<b>Children's Health Insurance Program</b>					
8	Tomohara & Lee (2007)	- and 0	<ul style="list-style-type: none"> <li>▪ No effect for women in general</li> <li>▪ A decrease of 2 -4 work hours per week for non-while women</li> </ul>	Q	US
9	Lee & Tomohara (2008)	- and 0	<ul style="list-style-type: none"> <li>▪ No effect in general</li> <li>▪ 8-10.6 pp decrease in employment likelihood for non-while women</li> </ul>	Q	US
<b>Affordable Care Act and other state level programs</b>					
10	Garthwaite et al. (2013)	-	<ul style="list-style-type: none"> <li>▪ 0.3-0.6 pp decrease in aggregate employment rate (or an immediate increase in labour supply due to <b>disenrollment</b>)</li> </ul>	Q	US
11	Guy et al. (2012)	-	<ul style="list-style-type: none"> <li>▪ 2.2 pp decrease in full-time employment</li> <li>▪ 0.8 pp increase in part-time employment</li> <li>▪ 1.4 increase in likelihood of not working</li> </ul>	Q	US
12	Dague et al.(2014)	-	<ul style="list-style-type: none"> <li>▪ 2.4-10.6 pp decrease in employment likelihood</li> </ul>	Q	US
13	Moriya et al., (2016)	0	<ul style="list-style-type: none"> <li>▪ Statistically insignificant effect on part-time employment</li> </ul>	N	US
<b>Non-US</b>					
14	Bergolo & Cruces (2014)	+	<ul style="list-style-type: none"> <li>▪ 1.6 pp increase in benefit eligible registered employment</li> </ul>	Q	Uruguay

Q: Quasi-experimental, N: Non-experimental

Value '0' in the sign section means statistically insignificant



Outside the US, an isolated paper in Uruguay (Bergolo and Cruces, 2014) that delves into the extension of health coverage to dependent children of registered private sector workers reports that people increase their labour supply in the benefit-eligible employment sector to make them eligible for health insurance. Notwithstanding, this is the only study on this topic outside the US.

*Labour supply effects of universal health coverage*

Table 6 summarises the labour supply effects of universal coverage in Taiwan and Thailand. The result is mixed and varies between negative (Chou & Staiger, 2001; Kan & Lin, 2009), statistically insignificant (Chou et al., 2002), positive (Wagstaff & 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 1995's 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 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 UHC reform in 2001 is indeed not fully universal as it merely targets formal employees. 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 for Thai married women, who were more likely to work less before the reform (ibid.).

**Table 6: Universal health coverage and labour supply effects**

No.	Study	Sign	Magnitude	Methodology	Intervention	Country
1	Chou & Staiger (2001)	-	▪ 4 p.p decrease in employment probability of married women	N	UHC in 1995	Taiwan
2	Chou et al.(2002)	0	▪ Statistically insignificant effect on labour supply of married women	Q	UHC in 1995	Taiwan
3	Kan & Lin (2009)	-	▪ a decrease of 2 work hours per week for private sector employees	Q	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	UHC in 1995	Taiwan
5	Wagstaff & 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	UHC in 2001	Thailand

Q: Quasi-experimental, N: Non-experimental

UHC: Universal health coverage expansion

The remaining studies which do not fit in any of the above categories are presented in Table 7. It is obvious from Table 7 that this collection is extremely fragmented. 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 & Moreno-Serra, 2007) and a decline in the employment ratio (Wagstaff & Moreno-Serra, 2007; 2015). Second, in the US where health insurance is mainly tied to and provided by employers, any increase in health insurance premiums is borne largely by employees via an increase in unemployment (Baicker & Chandra, 2005) and a decrease in hours worked (Baicker & Chandra, 2005; 2006).

**Table 7 : Health insurance and labour supply effects in isolated papers**

No.	Study	Sign	Magnitude	Methodology	Intervention	Target population	Country
<b>Employer-provided health insurance for employees</b>							
1	Kaestner & Simon (2002)	+ and 0	<ul style="list-style-type: none"> <li>No effect on week of work ;</li> <li>0.4- 0.7 increase in hour per week for employees in medium firms</li> </ul>	N	Employer-sponsored health insurance reform	people aged 18-54, used to be employed excluding self-employment	US
2	Wolaver et al., (2003)	-	<ul style="list-style-type: none"> <li>0.8 – 5.4-pp decrease in full-time employment</li> </ul>	N	employment-tied health insurance	working individuals, not very well specified	US
<b>Rising premium</b>							
3	Baicker & Chandra (2005)	-	<ul style="list-style-type: none"> <li>8% decrease in full-time work</li> <li>6% decrease in employment (associated with 40% increase in premium)</li> </ul>	Q	Rising health insurance premiums	Not Available	US
4	Baicker & Chandra (2006)	-	<ul style="list-style-type: none"> <li>1.2 pp decrease in aggregate employment probability</li> <li>2.4% decrease in hour worked</li> <li>1.9 pp increase in likelihood of part-time work (associated with a 10% increase in health insurance premiums)</li> </ul>	Q	Rising health insurance premiums	individuals aged 22-64	US
<b>Social Health Insurance</b>							
5	Wagstaff & Moreno-Serra (2007)	-	<ul style="list-style-type: none"> <li>100% increase in unemployment rate</li> <li>6.7-10 pp decrease in employment-to-population ratio</li> </ul>	Q	Social Health Insurance	Macro data	Central Asia
6	Wagstaff & Moreno-Serra (2015).	-	<ul style="list-style-type: none"> <li>10% decrease in employment</li> </ul>	Q	Social Health Insurance	Macro data	EE and CA
<b>Others</b>							
7	Boyle & Lahey (2010)	-	<ul style="list-style-type: none"> <li>2.7-3.33% more likely not working as a result of gaining coverage</li> </ul>	Q	Expansion of health insurance for veterans	male veterans aged 55-64	US
8	Boyle & Lahey (2016)	+ and -	<ul style="list-style-type: none"> <li>1-2 pp increase in employment likelihood for women if their husbands receive veterans affairs insurance</li> <li>0.75 pp decrease in employment likelihood for male veterans</li> <li>1.46 pp decrease in likelihood of working part-time for male veterans</li> </ul>	Q	Veterans affairs expansion	senior married couples aged 55-64	US

Q: Quasi-experimental, N: Non-experimental;

### 4.3 Health insurance and self-employment

Table 8 presents the findings of studies on the relationship between health insurance and self-employment. Unsurprisingly, a dominant number of studies are from the US (14/16).

**Table 8: Health insurance and self-employment**

No.	Study	Sign	Magnitude	Methodology	Country
<b>US</b>					
<b>Tax subsidy or tax deductibility to reduce premiums for informal workers</b>					
1	Heim & Lurie (2010)	+	<ul style="list-style-type: none"> <li>▪ 1.5 pp increase in self-employment likelihood</li> <li>▪ 0.8 pp increase in self-employment entry</li> <li>▪ 2.8 pp decrease in exit</li> </ul>	Q	US
2	Gurley-Calvez (2011)	+	<ul style="list-style-type: none"> <li>▪ 7.4% decrease in <b>self-employment exit</b> is associated with tax deductibility for health insurance</li> </ul>	Q	US
3	Velamuri (2012)	+	<ul style="list-style-type: none"> <li>▪ 34%-56% increase in self-employment</li> </ul>	Q	US
4	Gumus & Regan (2015)	+	<ul style="list-style-type: none"> <li>▪ 8.1% increase in entry into self-employment for men;</li> <li>▪ 24.4% increase in entry for single men;</li> <li>▪ 11.2 % decrease in exit rate</li> </ul>	Q	US
<b>Spousal coverage</b>					
5	Wellington (2001)	+	<ul style="list-style-type: none"> <li>▪ 2.3-4.4 pp increase in self-employment likelihood for husbands who get coverage via their spouse's employers</li> <li>▪ 1.2-4.6 4 pp increase in self-employment likelihood for wives who get coverage via their spouse's employers</li> </ul>	Q	US
6	Gai & Minniti (2015)	+ and -	<ul style="list-style-type: none"> <li>▪ 0.5-2 pp increase in the likelihood of self-employment of the other spouse if a spouse is health insurance holder</li> <li>▪ 1.74-2.09 pp decrease in the likelihood of switching to self-employment of the policy holder</li> </ul>	Q	US
<b>Employer-provided health insurance</b>					
7	Zissimopoulos & Karoly (2007)	-	<ul style="list-style-type: none"> <li>▪ 0.7 pp decrease in self-employment likelihood for salary men</li> <li>▪ 0.1 pp decrease in self-employment likelihood for salary women</li> </ul>	N	US
8	Fairlie et al.(2011)	-	<ul style="list-style-type: none"> <li>▪ 0.013 pp increase in business ownership rate for those at 65 years old (the threshold of <b>aging-out</b>).</li> <li>▪ Not significant effect just before or after others groups aged 55-75</li> </ul>	Q	US
<b>Dependent coverage</b>					
9	Bailey (2013)	0	<ul style="list-style-type: none"> <li>▪ Statistically insignificant</li> </ul>	Q	US
10	Jia (2014)	+ and 0	<ul style="list-style-type: none"> <li>▪ No impact on entry decision for serious start-ups</li> <li>▪ 2.3-3.6 pp increase in the likelihood of self-employment entry</li> </ul>	N	US
<b>Others</b>					
11	DeCicca (2007)	+	<ul style="list-style-type: none"> <li>▪ 1.1-1.5 pp increase in self-employment likelihood</li> </ul>	Q	US
12	Niu (2014)	+	<ul style="list-style-type: none"> <li>▪ 0.71 pp increase in self-employment likelihood</li> </ul>	Q	US
13	Becker & Tuzemen (2014)	+	<ul style="list-style-type: none"> <li>▪ 0.5-0.82 pp increase in the share of self-employment in total employment</li> <li>▪ 0.3- 0.6 pp increase in share of total self-employment in total working age population</li> </ul>	Q	US
14	Chavda (2015)	0	<ul style="list-style-type: none"> <li>▪ Statistically insignificant</li> </ul>	Q	US
<b>Non-US</b>					
<b>Others</b>					
15	Fossen & König (2015)	-	<ul style="list-style-type: none"> <li>▪ 0.38 pp decrease in entry into self-employment (associated with an increase of 100 Euro in monthly premium)</li> </ul>	N	Germany
16	Wagstaff & Moreno- Serra (2015)	+	<ul style="list-style-type: none"> <li>▪ 17% increase in self-employment</li> </ul>	Q	28 EE and CA

Q: Quasi-experimental, N: Non-experimental; EE and CA: Eastern European and Central Asia countries

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 US (Heim & Lurie, 2010; Gurley-Calvez, 2011; Velamuri, 2012; Gumus & 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 & Tuzemen, 2014). On the other hand, ‘entrepreneurship lock’ which implies a negative effect of employment-tied 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 (Bailey, 2013; Jia, 2014) and spousal coverage (Wellington, 2001; Gai & Minniti, 2015) but the results are rather mixed and the number of existing studies on this topic is relatively thin.

Outside the US, only two publications are found, one for Central Asia (Wagstaff and Moreno-Serra, 2015) and the other for Germany (Fossen, F. M., & König, J., 2015). These two papers fall into the two literature strands described above. Fossen and König (2015) 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 US 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**

Ten references on informal sector work are shown in Table 9.

**Table 9: Health insurance and economic formalisation**

No.	Study	Sign	Magnitude	Methodology	Country
<b>US</b>					
<b>Employer- provided health insurance</b>					
1	Ahearn et al.(2013)	(+) Formality	▪ 19 pp increase in off-farm employment likelihood	N	US
<b>Non-US</b>					
<b>Universal Health Coverage</b>					
2	Liao & Taylor (2010)	(-) Formality	▪ 9.6-13.6 pp decrease in off-farm labour force participation of wives	Q	Taiwan
3	Aterido et al. (2011)	(-) Formality	▪ 3.1 pp decrease in entry into formality	Q	Mexico
4	Wagstaff & 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	Thailand
5	Azuara & Marinescu(2013)	Statistically insignificant on informality	▪ Statistically insignificant	N	Mexico
6	Campos-Vazquez & Knox (2013)	Statistically insignificant on informality	▪ Statistically insignificant	Q	Mexico
7	Bosch and Campos-Vazquez (2014)	(-) Formality	▪ 0.8% - 4.6 % decrease in number of formal SME enterprises	Q	Mexico
8	Camacho et al. (2014)	(+) Informality	▪ 4 pp increase in informal employment	N	Colombia
<b>Social Health Insurance that is financed by payroll tax</b>					
9	Wagstaff and Moreno-Serra (2007)	Statistically insignificant on informality	▪ Statistically insignificant	Q	Central Asia
<b>Others</b>					
10	Bérgolo & Cruces(2014)	(+) Formality	▪ 1.3 pp increase in likelihood to switch from informal to formal employment	Q	Uruguay

Q: Quasi-experimental, N: Non-experimental; pp: percentage point

According to Table 9, the effects are very mixed. In Thailand, effects of universal health coverage on economic formalisation differ across population groups (Wagstaff & 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., 2014). The other two papers analysing the labour supply effects of the same programme in Mexico however report statistically insignificant results (Campos-Vazquez and Nox, 2013 ; Azuara and Marinescu, 2013). 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 US 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 tied 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 & 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 review finds that the existing literature on labour supply effect of health insurance is US dominant, suggesting a large knowledge gap in other countries, especially emerging economies where health coverage is expanding. 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 (2004) and Madrian (2006) that: i) spousal coverage is associated with reduced labour supply of secondary earners, and ii) the labour supply effect of social assistance recipients of Medicaid is ambiguous. Importantly, at the time of the reviews, their collection mostly included papers on Medicaid. After more than a decade, we see that the literature of social assistance recipients has been expanded to also cover other programmes including CHIP, Affordable Care Act and other state-level interventions. Here, we have some evidence that non-while low income

women tend to reduce their labour supply to keep their children qualified for CHIP (Tomohara & Lee, 2007; Lee & 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., 2013; Dague et al., 2014).

Additionally, by focusing 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 US is as expected and consistent with an income-effect in the standard labour supply model. 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 unlinked-employment health coverage is increasingly provided along with the expanding universal health coverage.

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 evidence of labour supply distortion by CHIP and Affordable Care Act suggest a need for more research in the US and in other countries as well. It is also interesting to examine the mechanisms through which low income people react to health insurance availability as the evidence on this effect it is far from concrete.

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 & Shore-Sheppard, 2005; Strumpf , 2011) or both (Montgomery & Navin, 2000; Yelowitz, 2003). It is however unknown how and under which circumstances they would react differently as the difference in 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. Given the significance of the informal sector and self-employment to economic growth, it is recommended that more studies should be done. 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.

This study complements previous reviews in many ways. While previous reviews have mainly focused on the US, this review moves beyond that to bring new insights from elsewhere. Additionally, while the former only provides a quick review of the evidence without any explicit search protocol, our study is conducted in a systematic way with a transparent search procedure. By focusing on studies published after 2000, our reviewed studies address methodological issues in the pre-2000 literature and make up 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 use cross-sectional data (i.e. Olson, 1998; Buchmueller and Valletta, 1999) and hence cannot adequately address the effect of unobserved heterogeneity. Therefore, later studies in our review aim to fix those issues. For instance, Royalty and Abraham

(2006) address the endogeneity issue caused by assortative mating by allowing health insurance of both spouses to be endogenous and use ‘paid sick leave’ as an instrument. Kapinos (2009) follow Olson (2002) and employ husband’s union status and firm size as instruments for health coverage. Alternatively, Murasko (2008) and Zimmer (2010) use panel data techniques while Cebi and Wang (2013) employ 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 US (see table 5) and Taiwan’s Universal Health Coverage (see table 6). The variations are however explained by the various target population and the varied use of data ranges. 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.

## **CONCLUSIONS**

This review finds that the effects of health insurance on labour supply have been mostly studied in the US, 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 US and some other isolated cases. We find that quasi-experimental methods are the most frequently used and the post-2000 studies discussed in our review address two important technical issues (i.e. endogeneity and unobserved heterogeneity) which were not adequately accounted for in the pre-2000 literature and thus not considered in previous reviews by Gruber and Madrian (2002) and Madrian (2004). 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 US 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 US 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*, there is preliminary evidence that labour supply of people with health impairments is sensitive to the tie 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 it discourages them to work if they have no health coverage. *Fourth*, the labour supply effects of health insurance on Medicaid recipients in the US are ambiguous and relatively debatable because the findings are mixed and inconsistent even within one policy. However we have initial evidence of labour supply distortion caused by CHIP, Affordable Care Act and other public health insurance expansions. The picture outside the US 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-tied insurance can create 'entrepreneurship lock' in the US. General health coverage expansion which removes the link between employment and insurance seemingly boosts self-employment. Outside the US, preliminary evidence of entrepreneurship push and entrepreneurship lock is reported but more research is recommended. *Sixth*, 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, making it difficult to draw any definite conclusion.

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## **Annex 1: 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 (Francesches, 2010). 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 (Meho and Yang, 2006).

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 (for example working papers, book chapters). We also include working paper sources (NBER, ECONSTOR, IDEAS, IZA, CEPR, 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.

## Annex 2: Key terms used in the search

#	Dependent variable	#	Independent variable
<b>Labour supply</b>			
1	labour supply	1	health insurance
2	labour market effects	2	healthcare
3	work incentive	3	health coverage
4	hours work	4	medical coverage
5	labour force participation	5	medical aid
<b>Informality of the economy</b>			
1	Formality		
2	formal sector employment		
3	Informality		
4	informal sector		
<b>Self employment</b>			
1	self employment		
2	entrepreneurship		

### Appendix 1: Papers excluded during full-text screening

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 US
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 US
3	Feng & Zhao (2015).	University of Connecticut, Department of Economics Working Paper Series	Pure theoretical without empirical evidence
4	Gupta et al. (2015).	Social Science & Medicine	Not directly examine labour supply effect of health insurance. It rather compare labour supply effect of two different health systems in the US and Denmark
5	He & White (2013)	Medicare & 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 & 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 & Tran (2010).	Towson University Department of Economics Working Paper Series.	Pure theoretical without empirical evidence
9	Pashchenko & Porapakkarm(2013).	SSRN	Pure theoretical without empirical evidence
10	Pohl (2014).	SSRN	Pure theoretical without empirical evidence
11	Qin & 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



## Appendix 2: Labour supply of married individuals with health insurance

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 & Cobb-Clark (2000)	-	<ul style="list-style-type: none"> <li>▪ 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)</li> <li>▪ 6.2% decrease in labour supply for the whole US economy</li> </ul>	US	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 & Abraham (2006)	-	<ul style="list-style-type: none"> <li>▪ 10 (or 21) pp decrease in the probability of working full-time for women (men);</li> <li>▪ 14.4 (or 19.5) pp decrease in the probability of working 20 hours or more per week for women (men);</li> </ul>	US	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	6782 households	Spousal coverage	both married men and women in households where both partners are age between 19-64 and at least one partner is employed outside the home
3	Journal of Family and Economic Issues	Murasko (2008)	-	<ul style="list-style-type: none"> <li>▪ 7.9-18.7 pp decrease in probability of labour force participation</li> <li>▪ 1.01-12.9 reduced weekly hours for those working</li> </ul>	US	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)	-	<ul style="list-style-type: none"> <li>16pp decrease in probability of labour force participation</li> <li>13-25 decrease pp in probability of working full-time</li> </ul>	US	Instruments for Tobit and ordered Probit	weekly hours worked; employment status (ordered variable for not working/ part-time/ full-time)	March Current population Surveys (CPS)- pooled cross-sections	1995-2005	Not available	spousal coverage	married women
5	Industrial Relations: A Journal of Economy and Society	Wenger & Reynolds (2009)	- and 0	<ul style="list-style-type: none"> <li>2.3 pp decrease in fulltime work for men if wives have employer provided insurance;</li> <li>No effect on part-time job for men</li> <li>3.3pp decrease in part-time work for women if husbands have employer provided insurance;</li> <li>No effect on fulltime work for women</li> </ul>	US	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	Not available	spousal insurance	married adults aged 55-64
6		Cebi & Wang (2013)	-	<ul style="list-style-type: none"> <li>5.2-18.4 pp decrease in likelihood of working fulltime;</li> <li>0.5-9.4pp decrease in employment likelihood</li> <li>0.98-3.7 reduced work hours</li> </ul>	US	Three different econometric approaches were used for comparison: cross-sectional estimates from LPM and Probit models, cross-sectional	working (binary) fulltime (binary) and work hours per week	National Longitudinal Survey of Youth (NLSY) March 2000 Demographic supplement to Current Population	1989-2000 from NLSY (panel) and one cross-section in	12,822 married women from NLSY and 19,515 women from CPS	spousal coverage	married women aged 25-64

						instrumental variable and panel estimates (pooled ordinary least squares, random effects, fixed effects and first differencing)		Survey (CPS)	2000 from CPS			
7	Journal of Health Economics	Boyle & Lahey (2016)	+ and -	<ul style="list-style-type: none"> <li>▪ 1-2 pp increase in employment likelihood for women if their husbands receive veterans affairs insurance</li> <li>▪ 0.75 pp decrease in employment likelihood for male veterans</li> <li>▪ 1.46 pp decrease in likelihood of working part-time for male veterans</li> </ul>	US	DD	not working (binary); hours worked last week; working part-time (binary); self-employment (binary)	March Current Population Survey (CPS) and March Current Population Survey (CPS)	1992-2002	Not available	veterans affairs expansion	senior married couples aged 55-64

DD: Difference-in-Differences

### Appendix 3: 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. (2012)	- and 0	<ul style="list-style-type: none"> <li>▪ 2.0 pp decrease (5.8 % increase) in likelihood of full-time work</li> <li>▪ 3% decrease in weekly work hours</li> <li>▪ No effect on employment probability</li> </ul>	US	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	Discussion paper, Monash University	Hahn & Yang (2013)	-	<ul style="list-style-type: none"> <li>▪ 3.1 pp decrease in likelihood of full-time work (2.6 pp decrease for women and 3.7 pp decrease for men)</li> <li>▪ 2.1 pp decrease in employment likelihood</li> </ul>	US	DD	employment status (binary), hours worked, full-time (binary)	March CPS-pooled cross-sections	2001-2010	Not available	State-level extensions of dependent coverage in many states in 2010	students aged 19-24

3	Journal of Health Economics	Depew (2015)	- and 0	<ul style="list-style-type: none"> <li>▪ 2.65 pp decrease in likelihood of full-time work (3.7 pp decrease for women and 2.24 pp decrease for men)</li> <li>▪ No effect on labour supply participation for men</li> <li>▪ 1.5 pp decrease in labour supply participation for women</li> </ul>	US	DDD	labour force participation rate, percent change in hours worked, full-time employment (binary)	American Community Surveys (ACS)	2001-2010	Not available	expanded dependent health insurance	young individuals aged 19-29
4	American Journal of Public Health	Dahlen (2015)	-	<p>aging out (dependent coverage <b>disenrollment</b> at the cut-off 26 years old) is associated with</p> <ul style="list-style-type: none"> <li>▪ 7.9 pp increase in employment likelihood;</li> <li>▪ and 9.7% increase in the labour market participation for men</li> </ul>	US	Regression Discontinuity	employment likelihood; likelihood of labour force participation; likelihood of working full time	NHIS	2011-2013	10463 individuals	Patient Protection and Affordable Care Act	unmarried individuals aged 24-28

CPS: Current population Surveys; DDD: difference-in-difference-in-difference (tripled difference)

SIPP: Survey of Income and Program participation - panel data

### Appendix 4: 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).	+	<ul style="list-style-type: none"> <li>▪ 23.6 -32.1 pp decrease in exit likelihood for men</li> <li>▪ 13.9 -16.9 pp decrease in exit likelihood for women</li> <li>▪ 34.7 - 42.2 pp decrease in likelihood of job change for men</li> <li>▪ 19.1- 28 pp decrease in likelihood of job change for women</li> </ul>	US	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	US	DD with linear probability models	labour force participation (binary)	US Renal Data System	1991-1997	Not available	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 p.p increase in likelihood to stay in employment	US	DD for Linear probability models	employment status (binary)	Health and Retirement Study	1996-2008	1582 men	own employer insurance or spousal coverage	married, employed and insured men

DD: Difference-in-Differences

### Appendix 5: 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
<b>The introduction or expansion of Medicaid</b>												
1	Economic Inquiry	Montgomery & Navin (2000)	- and 0	<ul style="list-style-type: none"> <li>▪ 0-0.15 pp decrease in working probability;</li> <li>▪ 0-0.004 decrease in hours work per week</li> </ul>	US	Probit and OLS with fixed and random effects	Labour force participation (binary); hours worked	CPS	1980-1993	47,839 individuals	expansions in Medicaid eligibility	females aged 18-65 with at least one child under 15
2	Economic Research Initiative on the Uninsured, University of Michigan, Working Paper	Yelowitz (2003)	- and 0 and +	<ul style="list-style-type: none"> <li>▪ 0- 7.1 pp increase in likelihood of labour force participation (due to increase in income limit)</li> <li>▪ 1.7-4.2 pp decrease in likelihood of labour force participation (due to increase coverage for children)</li> </ul>	US	DD and DDD for Probit	labour force participation (binary)	CPS 1987-1997 and Survey of Income and Program Participation 1987-2000	1987-2000	Not available	Medicaid expansions starting in 1988 which result in dramatic increase in Medicaid eligibility and coverage	married women
3	Industrial and Labor Relations Review	Ham & Shore-Sheppard (2005)	0	<ul style="list-style-type: none"> <li>▪ Statistically insignificant</li> </ul>	US	Probit	labour force participation (binary)	CPS	1988-1996	36,628 individuals	Expansions of Medicaid's health insurance eligibility for single-headed families starting in mid 1980s	single mothers aged 18-55 with at least one child under 15
4	Journal of Health Economics	Strumpf (2011).	0	<ul style="list-style-type: none"> <li>▪ Statistically insignificant</li> </ul>	US	DDD for Probit	labour force participation (binary)	CPS	1963-1975	54,782 women	Introduction of Medicaid programme	single women aged 20-50

5	Social Work in Public Health	Rosen (2014)	-	<ul style="list-style-type: none"> <li>An increase of 6.07 work hours per week for those who are without Medical aid</li> </ul>	US	Multi-level regression	hours worked per week	CPS 2011 Annual Social and Economic Supplement	2011	1,547	Medicaid and CHIP	low income, unmarried female heads of households with children under 6
6	American Journal of Health Economics	Dave et al. (2015)	-	<ul style="list-style-type: none"> <li>20 pp increase in eligibility would reduce employment likelihood by 1.7-7.2 pp</li> </ul>	US	Theoretical Modelling and Testing using panel data with first differencing and fixed effect techniques	employment status (binary); Labour force participation (binary); weeks worked per year; hours worked per week	CPS	1985-1996	22,182 to 23,043 women per wave	Medicaid expansion	pregnant women
7	Health Affairs	Gooptu et al.(2016)	0	<ul style="list-style-type: none"> <li>Statistically insignificant</li> </ul>	US	DD	job loss (binary); job switching from full-time to part-time employment (binary)	CPS	2005-2015	352 556 individuals	Medicaid	adults with incomes below 138 percent of the federal poverty level,
<b>Children's Health Insurance Program (CHIP)</b>												
8	Journal of Family and Economic Issues	Tomohara & Lee (2007)	- and 0	<ul style="list-style-type: none"> <li>No effect for women in general</li> <li>A decrease of 2 -4 work hours per week for non-white women</li> </ul>	US	DD	hours worked	CPS	1996-2002	Not available	The enactment of the State Children's Health Insurance Program (SCHIP)in 1997	married women
9	Applied Economics	Lee & Tomohara (2008)	- and 0	<ul style="list-style-type: none"> <li>No effect in general</li> <li>8-10.6 pp decrease in employment likelihood for non-white women</li> </ul>	US	DD for Probit	employment status (binary)	CPS	1996-2002	Not available	State Children's Health Insurance Programme (SCHIP)	women in family with SCHIP benefits



Other programs												
10	NBER WP	Garthwaite et al. (2013).	-	<ul style="list-style-type: none"> <li>0.3-0.6 pp decrease in aggregate employment rate (or an immediate increase in labour supply due to disenrollment)</li> </ul>	US	DD and triple difference models	employment rate	CPS	2000-2007	a subsample out of 50,000 households in CPS	Tennessee's health care reform that leads to large disenrollment	people aged 21-64 without an advanced degree
11	Medical Care Research and Review	Guy et al. (2012)	-	<ul style="list-style-type: none"> <li>2.2 pp decrease in full-time employment</li> <li>0.8 pp increase in part-time employment</li> <li>1.4 increase in likelihood of not working</li> </ul>	US	DD for Logit and Ordered Logit	labour force participation (ordered variable)	CPS	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
12	NBER WP	Dague et al.(2014)	-	<ul style="list-style-type: none"> <li>2.4-10.6 pp decrease in employment likelihood</li> </ul>	US	Regression Discontinuity and Propensity Score Matching combined with DD	employment probability	State administration records in labour	2005-2011	Not available	Wisconsin's Badger Care Plus Core Plan. This provided health insurance to childless adults	non-elderly, non-disabled adults without dependent children ("childless adults").
13	Health Affairs	Moriya et al. (2016)	0	<ul style="list-style-type: none"> <li>Statistically insignificant effect on part-time employment</li> </ul>	US	fixed effects regressions for pooled cross-sections	Weekly hour work	CPS	2005-2015	Not available	Affordable Care Act	not well specified
14	Journal of Public Economics	Bergolo & Cruces (2014)	+	<ul style="list-style-type: none"> <li>1.6 pp increase in benefit eligible registered employment</li> </ul>	Uruguay	DD for OLS	Five various dummies: benefit-eligible employment; registered	Micro data from ECH survey- a pool of cross-	2004-2010	97,552 individuals	A healthcare reform in Uruguay that extended coverage to the	urban adults aged 25-55

							employment; unregistered employment; benefit-eligible employment; unemployed;	sections			dependent children of registered private sector workers	
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DD: Difference-in-Differences; DDD: Difference-in-Difference-in-Difference; CPS: March Current population Surveys. This is a pool of cross-sections

## Appendix 6: Labour supply effects of Universal Health Coverage

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 & Staiger (2001)	-	<ul style="list-style-type: none"> <li>▪ 4 p.p decrease in employment probability of married women</li> </ul>	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	<ul style="list-style-type: none"> <li>▪ Statistically insignificant effect on labour supply of married women</li> </ul>	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 & Lin (2009)	-	<ul style="list-style-type: none"> <li>▪ a decrease of 2 work hours per week for private sector employees</li> </ul>	Taiwan	Theoretical modelling combined with empirical test which uses DD and ratio-of-ratios with log-linear models	hours worked	Manpower Utilization 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	<ul style="list-style-type: none"> <li>▪ 17.8-21.7 pp reduction in labour force participation of married women in the second income quartile</li> <li>▪ No significant effect</li> </ul>	Taiwan	DD and DDD	labour force participation	Survey of Family Income and Expenditure (SFIE)	1994-1996	Not available	NHI in 1995	married couples

				for other income groups								
5	World Bank Policy Research Working Paper	Wagstaff & Manachatphong (2012)	+	<ul style="list-style-type: none"> <li>▪ 3.3-7 pp increase in employment for single men;</li> <li>▪ 2.3-7.5 pp increase for single women;</li> <li>▪ 6.1-11.6 pp increase for married women</li> </ul>	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

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

## Appendix 7: 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	Kaestner & Simon (2002)	+ and 0	<ul style="list-style-type: none"> <li>▪ No effect on week of work ;</li> <li>▪ 0.4- 0.7 increase in hour per week for employees in medium firms</li> </ul>	US	Multi level analysis	hours worked per week, weeks worked per year	CPS	1989-1998	Not available	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)	-	<ul style="list-style-type: none"> <li>▪ 0.8 – 5.4-pp decrease in full-time employment</li> </ul>	US	Multinomial logistic regression	Multinomial variable *	1988 and 1993 Employee Benefits Supplements to the CPS	1988-1993	3045 individuals	employment-tied health insurance	working individuals, not very well specified
3	The American Economic Review	Baicker & Chandra (2005)	-	<ul style="list-style-type: none"> <li>▪ 8% decrease in full-time work</li> <li>▪ 6% decrease in employment (associated with 40% increase in premium)</li> </ul>	US	Instrumental regressions	hours worked; part-time/fulltime share	Kaiser Family Foundation Survey 1996-2001; CPS 1996-2002, National practitioner data bank	1996-2002	Not available	Rising health insurance premiums	Not Available

4	Journal of Labour Economics	Baicker & Chandra (2006)	-	<ul style="list-style-type: none"> <li>▪ 1.2 pp decrease in aggregate employment probability</li> <li>▪ 2.4% decrease in hour worked</li> <li>▪ 1.9 pp increase in likelihood of part-time work (associated with a 10% increase in health insurance premiums)</li> </ul>	US	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
5	World Bank Policy Research Working Paper	Wagstaff & Moreno-Serra (2007)	-	<ul style="list-style-type: none"> <li>▪ 100% increase in unemployment rate</li> <li>▪ 6.7-10 pp decrease in employment-to-population ratio</li> </ul>	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	Not available	Transition to social health insurance in Central Asia	not applicable
6	a book chapter	Wagstaff & Moreno-Serra (2015).	-	<ul style="list-style-type: none"> <li>▪ 10% decrease in employment</li> </ul>	EE and CA	DD with instruments	employment, unemployment, self-employment rates, size of informal economy by GDP contribution	a combination of many databases	1990-2004	28 countries		not applicable
7	Journal of Public Economics	Boyle & Lahey (2010)	-	<ul style="list-style-type: none"> <li>▪ 2.7-3.33% more likely not working as a result of gaining coverage</li> </ul>	US	DD for Probit	employment status (binary), self-employment and part-time (binary)	March CPS	1992-2002	Not available	Expansion of health insurance for non-poor, non-disabled veterans	male veterans aged 55-64

8	Journal of Health Economics	Boyle & Lahey (2016)	+ and -	<ul style="list-style-type: none"> <li>▪ 1-2 pp increase in employment likelihood for women if their husbands receive veterans affairs insurance</li> <li>▪ 0.75 pp decrease in employment likelihood for male veterans</li> <li>▪ 1.46 pp decrease in likelihood of working part-time for male veterans</li> </ul>	US	DD	not working (binary); hours worked last week; working part-time (binary); self-employment (binary)	March CPS	1992-2002	Not available	veterans affairs expansion	senior married couples aged 55-64
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DD: Difference-in-Difference; DDD: Difference-in-Difference-in-Difference; CPS: March Current population Surveys. This is a pool of cross-sections

\*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

## Appendix 8: 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
<b>Tax subsidy or tax deductibility to reduce premiums for informal workers</b>												
1	Journal of Public Economics	Heim & Lurie (2010)	+	<ul style="list-style-type: none"> <li>▪ 1.5 pp increase in self-employment likelihood</li> <li>▪ 0.8 pp increase in self-employment entry</li> <li>▪ 2.8 pp decrease in exit</li> </ul>	US	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	Not available	Tax Reform Act 1986	prime age individuals aged 25-64
2	Contemporary Economic Policy	Gurley-Calvez (2011)	+	<ul style="list-style-type: none"> <li>▪ 7.4% decrease in <b>self-employment exit</b> is associated with tax deductibility for health insurance</li> </ul>	US	Probit and IV Probit	probability of self-employment exit	University of Michigan Tax Research Database on tax return. Panel data	1988-1990	Not available	Self-employment Contributions Act 1987	tax payers
3	Contemporary Economic Policy	Velamuri (2012)	+	<ul style="list-style-type: none"> <li>▪ 34%-56% increase in self-employment</li> </ul>	US	DD for Probit; Multinomial Logit	self-employment (binary)	March CPS	1985-1991	not available	Tax Reform Act 1986	women aged 18-64
4	Journal of Business Venturing	Gumus & Regan (2015)	+	<ul style="list-style-type: none"> <li>▪ 8.1% increase in entry into self-employment for men;</li> <li>▪ 24.4% increase in entry for single men;</li> <li>▪ 11.2 % decrease in exit rate</li> </ul>	US	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	Not available	spousal coverage and Tax Reform Act 1986	prime age men aged 25-60
<b>Spousal coverage</b>												



5	Contemporary Economic Policy	Wellington (2001)	+	<ul style="list-style-type: none"> <li>▪ 2.3-4.4 pp increase in self-employment likelihood for husbands who get coverage via their spouse's employers</li> <li>▪ 1.2-4.6 4 pp increase in self-employment likelihood for wives who get coverage via their spouse's employers</li> </ul>	US	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	16748 employed husbands and 13356 employed wives	spousal coverage	Non-disabled employed married white individuals aged 25-62. These individuals are not working in agriculture, fisheries, forestry
6	Journal of Small Business Management	Gai & Minniti (2015)	+ and -	<ul style="list-style-type: none"> <li>▪ 0.5-2 pp increase in the likelihood of self-employment of the other spouse if a spouse is health insurance holder</li> <li>▪ 1.74-2.09 pp decrease in the likelihood of switching to self-employment of the policy holder</li> </ul>	US	DD for Probit	self-employment (binary)	Medical Expenditure Panel Survey	2000-2008	15,839 observations	spousal coverage	married working individuals aged 18-62
<b>Employer provided health insurance</b>												
7	Labour Economics	Zissimopoulos & Karoly (2007)	-	<ul style="list-style-type: none"> <li>▪ 0.7 pp decrease in self-employment likelihood for salary men</li> <li>▪ 0.1 pp decrease in self-employment</li> </ul>	US	Multinomial logit model	Different dummies: transition from full-time salaried work to self-employment, retirement or to	Health and Retirement Study	1992-2000	34,920 person year (observations)	employer provided retirement health insurance;	individuals aged 51-69

				likelihood for salary women			another not working state (unemployed , disabled, not in the labour force)				employer provided health insurance	
8	Journal of Health Economics	Fairlie et al.(2011)	-	<ul style="list-style-type: none"> <li>▪ 0.013 pp increase in business ownership rate for those at 65 years old (the threshold of <b>aging-out</b>).</li> <li>▪ Not significant effect just before or after others groups aged 55-75</li> </ul>	US	DD for Probit, Discontinuity	<p>probability of moving from a wage job to self-employment (binary);</p> <p>probability of starting a business at age 65 (binary variable for Discontinuity Design)</p>	Annual Demographic File of March CPS	1996-2006	Not available	employer-provided health insurance	wage salary workers
<b>Dependent coverage</b>												
9	SSRN WP	Bailey (2013)	0	<ul style="list-style-type: none"> <li>▪ Statistically insignificant</li> </ul>	US	DD for Probit, Logit and LPM accompanied by placebo tests	self-employment (binary)	IPUMS from American Community Survey	2000-2013	Not available	Affordable Care Act's dependent coverage mandate 2010	young adults aged 19-33
10	SSRN	Jia (2014)	+ and 0	<ul style="list-style-type: none"> <li>▪ No impact on entry decision for serious start-ups</li> <li>▪ 2.3-3.6 pp increase in the likelihood of self-employment entry</li> </ul>	US	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

Others												
11	SSRN WP/ ECONSTOR WP	DeCicca (2007)	+	<ul style="list-style-type: none"> <li>1.1-1.5 pp increase in self-employment likelihood</li> </ul>	US	DD	self-employment (binary)	BRFSS	1991-1996	382,670	New Jersey's Individual Health Coverage Plan 1993	adults aged 25-59
12	ILR Review	Niu (2014)	+	<ul style="list-style-type: none"> <li>0.71 pp increase in self-employment likelihood</li> </ul>	US	DD	self-employment status (binary)	March CPS	1995-2011	Not available	Massachusetts Health Care Reform 2006	individuals aged 25-54
13	The Federal Reserve Bank of Kansas City, Research Working Papers	Becker & Tuzemen (2014)	+	<ul style="list-style-type: none"> <li>0.5-0.82 pp increase in the share of self-employment in total employment</li> <li>0.3- 0.6 pp increase in share of total self-employment in total working age population</li> </ul>	US	DD and synthetic control method	share of total unincorporated self-employment in total employment; share of self-employment in working-age population	CPS and Annual Social and Economic Supplement (ASEC)- a pool of cross-sections	1994-2012	Not available	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	<ul style="list-style-type: none"> <li>Statistically insignificant</li> </ul>	US	DD	yearly percentage change in share of self-employment	American Community Surveys (ACS) combined with Non-employer Statistics from US Census	2000-2012	Not available	Massachusetts Health Care Reform Act of 2006	Not Available
15	ECONSTOR WP	Fossen & König (2015)	-	<ul style="list-style-type: none"> <li>0.38 pp decrease in entry into self-employment (associated with an</li> </ul>	Germany	Hazard rate model with sample selection	probability of entry into self-employment (binary)	German Social Economic	2000-2012	20,000 individuals in 11,000	public health insurance	individuals aged 19-59

				increase of 100 Euro in monthly premium)				Panel		households		
16	a book chapter	Wagstaff & Moreno- Serra (2015)	+	<ul style="list-style-type: none"> <li>▪ 17% increase in self-employment</li> </ul>	EE and CA	DD with instruments	employment, unemployment, self-employment rates, size of informal economy by GDP contribution	a combination of many databases	1990-2004	28 countries	Social Health Insurance	Not Available

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

## Appendix 9: 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
<b>US</b>												
1	Journal of Agriculture and Resource Economics	Ahearn et al.(2013)	(+) Formality	<ul style="list-style-type: none"> <li>▪ 19 pp increase in off-farm employment likelihood</li> </ul>	US	2 stage simultaneous Probit model	whether to work off-farm (binary)	2010 Agricultural resource Management Survey	2010	3,025 farm households	Employer provided health insurance	farm households with farm operator younger than 65
<b>Non-US</b>												
2	Journal of Agricultural and Resource Economics	Liao & Taylor (2010)	(-) Formality	<ul style="list-style-type: none"> <li>▪ 9.6-13.6 pp decrease in off-farm labour force participation of wives</li> </ul>	Taiwan	DD and DDD for Probit	off-farm employment (binary)	Survey of Family Income and Expenditure (SFIE). A series of cross-sections	1992-1997	7,809 households	Universal National Health Insurance (NHI) 1995	Wives in farm households
3	WB Working Paper	Aterido et al. (2011)	(-) Formality	<ul style="list-style-type: none"> <li>▪ 3.1 pp decrease in entry into formality</li> </ul>	Mexico	DD in multilevel analysis	probability of working in formal sector for both individual and household level	National Employment Survey (nationally representative), panel data	2000-2009	10 million individuals aged 15-65 or around 100,000 households per period	Seguro Popular', a non-contributory health program for informal households	households who are uncovered with health insurance before
4	World Bank Policy Research Working Paper	Wagstaff & Manachotphon g (2012)	(-) formality for men (+)informality for all	<ul style="list-style-type: none"> <li>▪ 3 pp decrease in formal employment for men;</li> <li>▪ 5.8-10.2 pp increase in informal employment for single men;</li> </ul>	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

				<ul style="list-style-type: none"> <li>▪ 4-7.4 pp increase for married men;</li> <li>4.6-8.2 pp increase for single women;</li> <li>▪ 6.7-12.5 pp increase for married women</li> </ul>								
5	Journal of Health Economics	Azuara & Marinescu (2013)	Insignificant	<ul style="list-style-type: none"> <li>▪ Insignificant on informality</li> </ul>	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	Not available	Seguro Popular', a non-contributory health program for informal households	urban individuals
6	A book by El Colegio de México, Centro de Estudios Económicos	Campos-Vazquez & Knox (2010)	Insignificant	<ul style="list-style-type: none"> <li>▪ Insignificant on informality</li> </ul>	Mexico	DD	Probability of moving from formal to informal sector (binary)	Labour Force Survey combined with individual-level Oportunidades dataset	2001-2004	28,675 individuals aged 15-65	Mexico's Seguro Popular Program providing free or subsidized 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	<ul style="list-style-type: none"> <li>▪ decrease of 0.8% (after the implementation) to 4.6% (after 4 years of the policy) in number of formal SME</li> </ul>	Mexico	DD	log total formal employment registration	Administrative data from the Mexican Institute of Social Security (IMSS) merged with 2000	2000-2011	Not available	Seguro Popular', which provides free health insurance to informal households	formal employees

				enterprises				Population census				
8	The World Bank Economic Review	Camacho et al. (2014)	(+) Informality	<ul style="list-style-type: none"> <li>4 pp increase in informal employment</li> </ul>	Colombia	fixed effects for Probit model	informal employment status (binary)	Colombian Household Surveys - pooled cross sections and SISBEN interviews	1990-2005	Not available	Subsidized Regime-non-contributory health insurance for the poor under Universal health coverage in the 1990s	Eligible households for Subsidized Regime
9	World Bank Policy Research Working Paper	Wagstaff and Moreno-Serra (2007)	Insignificant	<ul style="list-style-type: none"> <li>Insignificant on Informality</li> </ul>	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	Not available	Transition to social health insurance in Central Asia	not applicable
10	a book chapter from 'Social Insurance, Informality, and Labour Markets: How to Protect Workers While Creating Good Jobs'. Oxford University Press	Bérgolo & Cruces (2014)	(+) Formality	<ul style="list-style-type: none"> <li>1.3 pp increase in likelihood to switch from informal to formal employment</li> </ul>	Uruguay	DD	informal employment status (binary)	household survey micro data from the Encuesta Continua de Hogares (ECH)-pooled cross sections	2001-2009	Not available	Healthcare Reform 2008 in Uruguay which extended coverage to registered workers' children	adults aged 19-60, who work in registered private sector

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

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