FEM42-15

FEMISE RESEARCH PAPERS

"Assessing the Macroeconomic and Welfare Effects of Universal Health Coverage (UHC): A Dynamic Microsimulation-based Computable General Equilibrium (CGE) Applied to Palestine"

Directed by: Pr. Mohammad Abu-Zaineh
(Aix-Marseille University, France)

With Contributions by:

Sameera Awawda, Institute of Community and Public Health (ICPH), Birzeit University, Palestine

August 2018

Ce rapport a été réalisé avec le soutien financier de l'Union Européenne dans le contexte du projet UE-FEMISE sur: "Support to economic research, studies and dialogue of the Euro-Mediterranean Partnership". Le contenu du rapport relève de la seule responsabilité des auteurs et ne peut en aucun cas être considéré comme reflétant l'opinion de l'Union Européenne.

This document has been produced with the financial assistance of the European Union within the context of the EU-FEMISE project "Support to economic research, studies and dialogue of the Euro-Mediterranean Partnership".. The contents of this document are the sole responsibility of the authors and can under no circumstances be regarded as reflecting the position of the European Union.

Assessing the Macroeconomic and Welfare Effects of Universal Health Coverage (UHC): A Dynamic Microsimulation-based Computable General Equilibrium (CGE) Applied to Palestine

Authors

(1) **Sameera Awawda**. Research Assistant, Institute of Community and Public Health (ICPH), Birzeit University, P.O. Box 14, Birzeit, West Bank, Palestine and PhD candidate at Aix-Marseille School of Economics. Aix-Marseille University, E-mail: sameera.awawda@amu-univ.fr

(2) **Mohammad Abu-Zaineh**. Associate Professor. Aix-Marseille Univ., CNRS, EHESS, Centrale Marseille, AMSE, and IDEP, 5 boulevard Maurice Bourdet CS50498 F-13205 Marseille cedex 01, France. E-mail: mohammad.abu-zaineh@amu-univ.fr

Key words

Universal Health Coverage, Dynamic Micro-simulation, Computable General Equilibrium; Demographic and Epidemiological Transitions, Developing Countries.

Abstract

The implementation of “Universal Health Coverage” (UHC) poses serious challenges. Some of these stem from the macro-fiscal space considerations while others relate to the micro-behavioral sphere. This paper seeks to assess the macro-fiscal conduciveness of UHC-oriented reforms in Palestine using a dynamic microsimulation-based Computable General Equilibrium (CGE) approach. Overall, UHC-oriented reform appears to enhance social welfare and economic growth. However, a parallel expansion in the breadth and width of coverage can have a sizeable budgetary impact, with fiscal deficit representing 14% of the GDP, of which about 2% is due to UHC. The latter would absorb about 10% of GDP, 15% of public spending and 57.4% of public spending on health. Under conditions of narrow fiscal space, an additional annual growth of 3.0% is required to progress along all the dimensions of UHC. A set of policy measures, which can help achieve UHC in a financially sustainable manner is advanced.

Keywords: Universal Health Coverage; Dynamic Microsimulation; Computable General Equilibrium (CGE); Fiscal Space; Equivalent Variation; Developing Countries.

Acknowledgment: This work has been completed thanks to the support from FEMISE (*Forum Euroméditerranéen des Instituts de Sciences Économiques*).

1. Introduction

Universal Health Coverage (UHC) has been identified as a primary vehicle to fulfill all health-related goals in the recently adopted Sustainable Development Goals (SDGs) 2015-2030 (WHO 2015). By the same token, a global coalition of more than 500 leading health and development organizations has recently been formed with the aim of supporting governments to take actions that can accelerate the implementation of UHC (Kelsall, Hart, and Laws 2016). Furthermore, a framework for action on advancing UHC in the Middle-East and North African (MENA) region has been proposed with particular attention to the deprived groups, rural populations, the unemployed and informal labors (WHO 2015a). While this reflects a strong commitment on the part of policy-makers towards UHC, *its implementation continues to spark vigorous debates amongst policy-makers, scholars and the international health community* (Dye, Reeder, and Terry 2013). *Much of the recent debates focus, however, on the macro-fiscal* challenges that *developing countries may face while implementing UHC-oriented reforms* (Somanathan et al. 2014; Giedion, Alfonso, and Díaz 2013)*. Indeed, s*ome of UHC implementation challenges relate to the *macro-fiscal space* considerations that include, *inter alia*, the issue of fiscal sustainability of the proposed UHC (Chanel, Makhloufi, and Abu-Zaineh 2016). Other challenges pertain to the *micro-behavioral sphere*; i.e., individuals' behavior *vis-à-vis* the proposed insurance scheme, particularly, its impact on their social welfare and their abilities-to-join and to-contribute (Giedion, Alfonso, and Díaz 2013; Lagomarsino et al. 2012; Mills et al. 2012).

Despite the rising interest, the bulk of the available literature on the *UHC-oriented reforms* remains hitherto largely anecdotal documenting countries' experiences and implementation challenges (Cotlear et al. 2015; Lagomarsino et al. 2012; Tang, Tao, and Bekedam 2012; Reddy et al. 2011). A recent study by Wagstaff et al. (2016) has addressed the question of how to measure progress towards UHC using a 'mashup' index. Yet, there is still a lack of clarity on whether (and to what extent) developing countries can fiscally afford UHC within the specified SDGs' timespan of 2015-2030. Nevertheless, the potential welfare effects of such endeavor at both micro- and macro-level remain evidenceless.

This study aims at addressing the above issues relating to both the macro-fiscal space and micro-behavioral sphere. Specifically, the paper seeks to address the following key questions: what would be the impact of UHC on government deficits, GDP growth and social welfare? These questions are examined using a dynamic micro-simulation method within a Computable General Equilibrium (CGE) framework. A similar framework has previously been proposed (e.g., Auerbach and Kotlikoff 1981) and applied to ex-post assess the macroeconomic effects of health insurance reform in Japan (Ihori et al. 2011). However, to our knowledge, no previous attempts have been made to apply such methods to *ex-ante* assess *UHC-oriented reform* in the context of developing countries. This paper examines the macro- and micro- effects of a gradual expansion of UHC under different static and dynamic scenarios in the context of one developing country: the occupied Palestinian territory (the oPt). We adopt the WHO’s definition of UHC in terms of the “Universal Coverage Cube” (UCC). UCC involves three dimensions: the breadth (the percentage of population covered), the width (the percentage of healthcare costs covered) and the depth (the percentage of healthcare services covered) (WHO 2010).

Akin to many developing countries, the oPt’s Ministry of Health (MoH) has undertaken several reforms of the *Government Health Insurance* (GHI) scheme in the view of attaining UHC (Mataria et al. 2009). Official sources report a *de jure* coverage of about 65% of the population. The GHI benefit package includes all healthcare except for a number of specified services (e.g., organ transplantation, road and work accidents, medical durable devices ….). A policy of adjusting premiums was applied with the aim of promoting affordable contributions. This was done through flattening the contributions of enrollees with a rate ranging between 5 to 6% of their monthly incomes (Abu-Zaineh 2009). In addition to premiums, which representing about 25% of total public health expenditure, insured patients are also required to make co-payments (representing about 15% of total public health expenditure) (MoH 2013; World Bank 2008). The current GHI system appears thus to be far from being self-funded with most of the cost of covered services being funded by other sources, mainly general taxes revenues (WHO 2016).

Previous reforms of the GHI have, however, been largely ad hoc, resulting in an increase in the government’s budgetary deficits and debts in addition to an overall deterioration in provision capacity of the health system (Giacaman, Abdul-Rahim, and Wick 2003). With UHC being adopted by the 2015-2030 SDGs, new UHC-oriented reforms are currently being considered (WHO 2016). Results emerging from this study can thus help inform health system reforms towards achieving UHC in a fiscally sustainable manner. Besides the important impact that its results are expected to have on reforms of the Palestinian healthcare sector, the results could also be useful to other developing countries seeking to achieve UHC.

The remaining of this paper is organized as follows. The next section presents the method, simulation scenarios and the datasets used in the analysis. Section 3 presents the results. Section 4 discusses the main findings and Section 5 concludes with some policy recommendations.

2. Methods and Material

2.1 Model Specification

We build a Computable General Equilibrium (CGE) model that allows to assess the impact of UHC-oriented reform on the micro- and macro-economic outcomes. A multi-period agent-based model is adopted at the micro-level and applied within a CGE model that consists of four agents: households, firms, government and the foreign sector. The model assumes that both households and firms optimize their behaviors to allocate their resources on consumptions and inputs, respectively, while the behaviors of the government and foreign sector are exogenously determined. The following sub-sections lays out the model.

2.1.1 Household

Each household head maximizes the expected joint utility of the whole household subject to two budgets constraints: (i) a constraint that accounts for health insurance premiums, π_t, copayment share, κ_t, and out-of-pocket payment share of healthcare, o_t, where $o_t = 1$ and $\pi_t = \kappa_t = 0$ for uninsured households, and (ii) another constraint that allows savings to be endogenously determined as a residual of total income and medical expenditure. Thus,

$$\max_{x_i, h_i, S_i} V_{i,j,t} = \sum_{t=t_0}^{T} \sum_{i=1}^{n_H} \beta^{t-t_0} q_{i,t} U_j\left(x_{i,t}, h_{i,t}\right) \tag{1}$$

$$s.t\ (1-\tau_{y_t}-\pi_t)y_{H,t}=\sum_{i=1}^{n_H}[Pc_t(1+\tau_{c_t})x_{i,t}+(1-(1-\kappa_t)(1-o_t))h_{i,t}+S_{i,t}] \quad (2)$$

$$S_j=s[(1-\tau_{y_t}-\pi_t)y_{H,t}-(1-(1-\kappa_t)(1-o_t))h_{i,t}] \quad (3)$$

where $\beta\in[0,1]$ is the discount factor and $[t_0\,,\,T]$ is the time spanning over 15 years; $q_{i,t}\in[0,1]$ is the individual’s survival rate at time t, which differs across age-sex groups; n_H is the household size; $x_{i,t}$ is the member i^{th} total expenditure on goods and services other than healthcare[1] ($h_{i,t}$); $y_{H,t}$ is total household income from all sources; τ_{y_t} is the income tax rate; Pc_t is a consumer price index of x, τ_{c_t} is the consumption tax rate, $S_{i,t}$ is saving and s is the marginal propensity to save. It is of interest to note that the depth (the percentage of services covered) and the width (the percentage of costs covered) of UCC are captured in our model as follows. First, given that o_t is the share of uncovered healthcare costs, $1-o_t$ captures the depth of coverage[2]. Second, given that $\kappa_t(1-o_t)h_{i,t}$ represents the co-payments (cost sharing) for covered services, the total amount paid by individuals can thus be obtained as $o_th_t+\kappa_t(1-o_t)h_t$. The latter can be rewritten as $(1-(1-\kappa_t)(1-o_t))h_{i,t}$, where $(1-\kappa_t)(1-o_t)$ captures the width (i.e., the rate of reimbursement of services covered).

The specification of the utility function is the Constant Elasticity of Substitution (CES),

$$U_j(x_{i,t},h_{i,t})=[\alpha_jx_{i,t}^r+(1-\alpha_j)h_{i,t}^r]^{1/r} \quad (4)$$

where α_j and $1-\alpha_j$ are the expenditure shares of x and h, respectively. Both shares vary across age-sex groups, j. The parameter r is a constant term that captures the elasticity of substitution (δ) between x and h, where $\delta=1/(1-r)$.

We assume that each household member receives an amount of income, $y_{i,t}$, which is calculated using the OECD equivalence scale (OECD 1982). The demand function for healthcare for each household’s member is thus given as,

[1] For the healthcare sector, we assume that what individuals spend on healthcare is the demand side and what the government spend is the supply side.

[2] Given that individuals’ utility from $x_{i,t}$ and $h_{i,t}$ are measured in monetary terms, the depth which represents the range of services covered is captured here in monetary terms.

$$h_{i,t} = \frac{(1-\tau_{y_t}-\pi_t)y_{i,t}}{(1-(1-\kappa_t)(1-o_t))\left[1+\left(\frac{1-\alpha_j}{\alpha_j}\right)^{\delta}\left(\frac{Pc_t}{(1-(1-\kappa_t)(1-o_t))(1-s)}\right)^{\delta-1}\right]} \quad (5)$$

The corresponding demand function for other goods and services is given as,

$$x_{i,t} = \frac{(1-s)(1-\tau_{y_t}-\pi_t)y_{i,t}}{Pc_t\left[1+\left(\frac{\alpha_j}{1-\alpha_j}\right)^{\delta}\left(\frac{(1-(1-\kappa_t)(1-o_t))(1-s)}{Pc_t}\right)^{\delta-1}\right]} \quad (6)$$

And the saving function is,

$$S_j = s(1-\tau_{y_t}-\pi_t)y_{i,t}[1-\frac{1}{\left(1+\left(\frac{1-\alpha_j}{\alpha_j}\right)^{\delta}\left(\frac{Pc_t}{(1-(1-\kappa_t)(1-o_t))(1-s)}\right)^{\delta-1}\right)}] \quad (7)$$

The above equations give the values of x and h (i.e. the current consumption levels) and S (which is part of future consumption) for each individual as a function of the amount of resources allocated to each household’s member from total household income as well as prices and goods’ shares.[3]

Moreover, the above demand functions give the values of expenditures and savings for each individual conditional on need for, and use of healthcare as well as reimbursement. Thus, we estimate for each individual the following expected healthcare need utility,

$$EU_i^{need} = prob_i^{need}V_i^{need} + (1-prob_i^{need})V_i^{min} \quad (8)$$

where $prob_i^{need}$ is the probability of need for healthcare estimated for each age-sex group using data from the 2004 Palestinian Health Expenditures Survey (PHES) on the utilization of different types of healthcare services (e.g., GP, inpatient and outpatient hospitalization and delivery). Eq. (8) assumes that there is a minimum value of healthcare utilization needed to maintain health status. The respected levels of utility for each individual are given by V_i^{need} and V_i^{min}.

Our interest is to assess the impact of UHC-oriented reform on individuals’ social welfare. One way to account for changes in social welfare is to measure the Equivalent

[3] Our budget constraint shows what households hold at time t, bequests and assets are not included because of the nature of data. So instead of finding the value of the ratio of current consumption to future consumption (Euler formula), our model allows to endogenously find the value of current consumption x and h, and part of the future consumption S.

Variation (EV). In the context of our study, the EV can be defined as the amount of income individuals are willing to give up in order to move from the ex-ante level of utility (prior to UHC) to the ex-post level of utility (post UHC) (Mas-Colell, Whinston, and Green 1995) [4]. The EV, which can also be interpreted in terms of individual's Willingness-To-Pay (WTP), is computed as,

$$EV_{i,t} = \frac{EU_{i,t}^{need} - EU_{i,0,t}^{need}}{EU_{i,0,t}^{need}} y_{i,0,t} \tag{9}$$

Another interesting indicator can be obtained by dividing $EV_{i,t}$ by the corresponding individual's equivalent income (EV/y). The latter measures the relative change in social welfare; i.e., expected utility gain.

2.1.2 Firms

Firms are assumed to operate in a perfectly competitive market and to minimize their costs,

$$\min_{K,L} cost(K_t, L_t) = \left[r_t\left(1+\tau_{k_t}\right) + d_t\right]K_t + w_t\left(1+\tau_{l_t}\right)L_t \tag{10}$$

subject to a Cobb-Douglas production function,

$$Q_t = T_t {K_t}^{\gamma} {L_t}^{1-\gamma} \tag{10}$$

where r, w, τ_{k_t} and τ_{l_t} are prices of, and taxes on, total private and public capital, K, and labor, L, respectively, and d is the depreciation rate. Q is the value-added of output, T is technology parameter, γ and $(1-\gamma)$ are the shares of K and L, respectively. The demand equation for each inputs is,

$$K_t = \frac{Q_t}{T_t}\left(\frac{\gamma}{1-\gamma}\right)^{1-\gamma} \left(\frac{w_t(1+\tau_{l_t})}{r_t\left(1+\tau_{k_t}\right)+d_t}\right)^{1-\gamma}$$

$$L_t = \frac{Q_t}{T_t}\left(\frac{1-\gamma}{\gamma}\right)^{\gamma} \left(\frac{r_t\left(1+\tau_{k_t}\right)+d_t}{w_t(1+\tau_{l_t})}\right)^{\gamma} \tag{11}$$

[4] Another measure is the compensating variation (CV) – defined as the value of income a consumer can scarify to stay the initial level of utility after a change in prices or income (Chipman and Moore 1980). Both the EV and CV are commonly used in literature as measures of welfare and willingness-to-pay.

(12)

For the purpose of our study and for the sake of simplicity, we aggregate all the production sectors, which implicitly include healthcare sector. Moreover, healthcare account (revenues and expenditures) is separately explained below in the government account since we assume that the government is the provider of health insurance and healthcare services.

2.1.3 Government

Total government revenues (GR) is given by,

$$GR_t = TAXR_t + TRGROW_t + GRI_t \tag{13}$$

where $TAXR$ is the general tax revenues, $TRGROW$ is the transfers to government from the rest of the world and GRI is the additional revenues raised from the new insurance reform. $TAXR$ includes all forms of taxations. Thus,

$$TAXR_t = \tau_{c_t} C_t + TRM_t + \tau_{y_t} Y_t + \tau_{k_t} r_t K_t + \tau_{l_t} w_t L_t + OT_t \tag{14}$$

where C is aggregate consumption expenditure, TRM is the tax on imported goods, Y is the total income and OT is other taxes. Government revenues from the insurance account is given by,

$$GRI_t = \sum \pi_t y_{t,w} + (1-(1-\kappa_t)(1-o_t))h_{t,w} \tag{15}$$

where y_w is the age-sex group mean income and h_w is the mean health expenditure. Thus, GRI is total contributions paid as premiums from income by those who enter the new insurance reform in addition to the share of healthcare expenditure paid as copayment and out-of-pockets.

Total government expenditure G is given by,

$$G_t = GC_t + GI_t + TRF_t + GEXI_t \tag{16}$$

where GC is the government consumption expenditure; GI is the public investment; TRF is government transfers and subsidies, and $GEXI$ is the amount that government spends on the healthcare of the new reform, “creating” healthcare supply in order to respond to demand for healthcare.

$$GEXI_t = \sum (1-\kappa_t)(1-o_t)h_{t,w} \tag{17}$$

Lastly, the government saving (GS) is given as,

$$SG_t = GR_t - G_t \tag{18}$$

2.1.4 The foreign sector

The last complement account of the economy is the foreign sector account. The balance of payment (BoP) is given by,

$$M_t = E_t + TRHROW_t + TRGROW_t + SROW_t \tag{20}$$

where M is the total value of imports, E is the total value of exports, $TRHROW$ is the transfers to households from the rest of the world and $SROW$ is foreign savings.

2.1.5 Microsimulation within general equilibrium

In order to integrate individuals' behavior into the CGE model[5], we aggregate the estimated individual consumption expenditures as follows,

$$C_t = \sum_{j=1}^{n}\sum_{k=1}^{K} Pr_k N_j (Pc_t \overline{x}_{t,j} + (1-(1-\kappa_t)(1-o_t))\overline{h}_{t,j}) \tag{21}$$

where C is the weighted sum of consumption expenditures on healthcare and all other goods. Pr_k is the share of the population according to their health insurance status (insured, uninsured, newly insured), and N_j is the size of the age-sex group. Accordingly, Pr_k captures the breadth dimension of the UCC. The respected average expected consumption expenditures, $\overline{h}_j$ and $\overline{x}_j$, are obtained as follows,

$$\overline{h}_j = \sum_{i=1}^{J} prob_i^{need} h_i^{need} + (1-prob_i^{need})h_i^{min} \tag{22}$$

[5] Measuring the impact on individuals' well-being requires using individual-level data. This allows to estimate: (i) the impact of macroeconomic changes on individuals' behaviors, and (ii) the impact of demographic changes (age-gender) on macroeconomic variables.

$$\overline{x}_j = \sum_{i=1}^{J} prob_i^{need} x_i^{need} + (1 - prob_i^{need}) x_i^{min} \tag{19}$$

where h_i^{min} is minimum healthcare need and x_i^{min} is total consumption of goods and services associated with the minimum healthcare need.

2.2.6 Market clearing equation

The market clears when the value of goods and services produced in the economy equals the value of goods and services demanded by agents, thus,

$$GDP_t = Pp_t Q_t = C_t + G_t + K_{pv,t} + (E_t - M_t) \tag{20}$$

The producer price index, Pp, is determined by the zero profit condition as,

$$Pp_t Q_t = \left[r_t\left(1 + \tau_{k_t}\right) + d_t\right] K_t + w_t\left(1 + \tau_{l_t}\right) L_t \tag{21}$$

The consumer price index, Pc, is determined by the equilibrium in the good market given in Eq. (24). Lastly, assuming that the price of capital is normalized, the price adjustment in the labor market is given by,

$$\frac{w_t}{w_{t,0}} - 1 = ph\left(\frac{LS_{t,0}/u_{t,0}}{LS_t/u_t} - 1\right) \tag{26}$$

where ph is the Philips parameter (which is estimated to be -0.10), w_0 is the initial value of wage rate, u_0 is the initial level of unemployment and LS_0 is the initial level of labor supply. The unemployment rate, u_t, is given by $1 - \frac{L_t}{LS_t}$, where the labor supply is assumed to be constant across the timespan[6].

2.3 Data, Variable Definitions and Computations

We use micro-data from the latest Palestinian Expenditures and Consumption Survey (PECS-2011) while macro data are obtained from the Social Accounting Matrix (SAM-2011). The share parameters of the CES utility functions are calibrated based on PECS-2011. The discount factor captures the expected decrease in the future value of utility for each individual assuming β equals 0.99. The survival rate is measured for each 5-year interval using a proxy of the 2011 and 2015 demographic surveys. The OECD equivalence scale is

[6] Given the fact that the Palestinian economy is a small-open and a price-taker economy, the interest rate is assumed to be constant, thus the flow of foreign capital offsets the deficit in the capital market.

used to compute average equivalent income and expenditure for each individual (OECD 1982). As for the elasticity of substitution (δ), the value is calibrated using macro-level data. The estimated value of δ is found to be equal to 0.29 indicating complementarity between $\overline{h}_j$ and $\overline{x}_j$. Similarly, the marginal propensity to save (s) is calibrated using the macro-level data for 2011 and found to be equal to -0.113. Lastly, it is worth mentioning that in some simulations, we differentiate insurance premiums based on socio-economic status (equivalent income quantiles).

The model is, first, calibrated using the most recently available micro- and macro-level data for the year 2011. Then, a benchmark is created for the year 2015 (our base year) by adjusting the estimated results of 2011. Table 1 shows that our estimated values are generally close to those reported for the year 2011, indicating that our model is consistent. Observed discrepancies between the real and the estimated values from the CGE model are due to the fact that C is calibrated according to the optimization behavior.

Insert Table 1 here

We investigate the effects of an expansion in two dimensions of the UCC: (1) the breadth, from the current rate of 65% to full coverage of the population, and (2) the width from 50% to 60% of the total medical costs. In our model, the width is given by $(1-\kappa_t)(1-o_t)$, where the third dimension of the UCC, the depth, $(1-o_t)$, is set at 70%. The copayment rate, κ_t, is thus accordingly determined. For instance, setting the width at 50%, given $o_t = 30\%$, the value of κ_t is 28.5%. The depth represents a benefit package that includes ambulatory services, hospitalization and prescribed medications. In Palestine, expenditures on healthcare are classified into ambulatory healthcare including diagnostics and medical analyses (26.8%), hospitalization and nursing (40.8%), and medicine and medical goods including other healthcare expenditures (32.4%) (PCBS and MoH 2013).

As a point of departure, we run a static simulation analysis that explores the potential impact of altering the breadth and width on individuals' welfare (as captured by the EV) and on a set of macroeconomic variables (C, G, and GDP) under five scenarios. Then, we apply sequential changes to the benchmark in order to build the dynamic scenarios. These scenarios allow for changes in the socio-demographic and epidemiological profile of the population along with changes in the economic growth. For each year, we create a new baseline accommodating changes in the population size and structure as projected by UN population forecasts (United Nation 2015). Accordingly, the oPt is a country with high population growth rates (about 3%). As regards the annual economic growth, we use the PCBS forecasts for the year 2016 according to which the Palestinian economy is expected to grow by 3.3%.

Lastly, the potential changes in the epidemiological profile of the population are captured using a specific age-sex probabilities of need for medical care – initially estimated from the available data from the PHES (PCBS 2004). According to the UN projections, there are eventually more elderly in the Palestinian population who are more susceptible to non-communicable diseases (which represents about 75% of the burden of diseases in the oPt (WHO 2016)). Thus, we assume, in addition to the projected increase in the share of elderly (50 years and above), an increase by 20-30% in their probabilities of medical need. Similarly, we assume an increase by 10% and 20% in the probabilities for childhood immunization and medical need for women in the reproductive age, respectively. Of course, other techniques are available in the literature to account for the impact of *epidemiological transition*. However, using a more computationally involved technique is beyond the scope of this study, which lies in measuring the potential fiscal impact of UHC given an epidemiological change whatsoever.

3. Results

3.1 Static Simulations

In this subsection, we investigate the effects of an expansion in two dimensions of the UCC: the breadth (from the current rate of 65% to full coverage of the population) and the width (from 50% to 60% of the total medical costs). The following simulations are based on the 2015-baseline and explore five scenarios ($S1$- $S5$).

$S1$ assumes a proportional contribution rate as the current GHI (about 5.7% of the total household equivalent income). The width is set at 50%, thus copayment rate is 28.5%. Results, which are summarized in Table 2, shows that such an expansion would result in social welfare gains (as measured by the average value of the EV) of $254.03 per individual. Interestingly, at the macroeconomic level, the initial expansion (from 65% to 80% of the population) would result in a negative impact on the GDP growth of 1.32%. However, this negative impact starts to wipe out with the increase in the breadth of coverage: GDP falls by only 0.44% when the coverage reaches 90%, but grows by 0.46% when the whole population is covered. These fluctuations in the GDP can mainly be explained by changes in both private and public expenditures components, C and G. As shown in Table 2, total household consumption expenditure, C, falls by 1.18%, 1.89% and 2.60% while government expenditure, G, increases by 9.91%, 16.53% and 23.15% for the three rates of population coverage, respectively. However, given that C represents the lion’s share of the Palestinian GDP (about 75%), the rise in G, which results from the increase in the share of public health expenditure, can only counterbalance the fall in C, which results mainly from the decline in the share of private health expenditure (by 17.09%), at the full coverage of the population. Remarkably, despite the substantial increase in G, the additional revenues (of $1183.38 million) raised from the widening of the risk pool exceed the respected government expenditures (of $948.95 million) culminating into a decrease in government deficit by 27.04%.

Insert Table 2 here

$S2$ assumes a more generous insurance scheme with an initial expansion of the width from 50% to 60% of the total medical costs, resulting in a decrease in copayment rate to 14.3%, holding all other coverage parameters constant. Expectedly, this results in higher social welfare (*EV*=$345.52 *vs*. $254.03 under $S1$). Unlike the $S1$, the significant increase in G (by 29.46%) appears to compensate for the fall in C, which remains comparable with that of the $S1$ (2.76% *vs*. 2.60%). The increase in the width, which leads to lower private health expenditures (a fall by 20.38%) would allow individuals to reallocate their resources in favor of spending on other goods and services (an increase in x by 2.86%). Consequently, GDP grows by 1.91% at the full coverage of the population (see Table 2). However, the additional public expenditures, G, associated with this larger width ($1207.87 million) exceed the additional public revenues ($1037.90 million) resulting in an increase in government budget deficit by 24.79%. A further expansion in the width from 60% to 70% would lead to an additional improvement in the both the individual social welfare and economic growth[7]. However, such an expansion comes at the cost of exacerbating the government budget deficit (84.57%). Obviously, such significant increase in government budget deficit necessitates mobilizing additional resources to cover the additional costs of these generous insurance packages. This can be made through either raising copayments, κ, or insurance contributions π or both.

[7] Results, which are available upon request, are not presented in the table for the sake of space.

$S3$ shows the impact of raising copayment rate to 21.4% in addition to the contribution rate of 5.70%. The additional revenues raised through this source can help reduce government budget deficit by 1.90% (from $779.44 million to $764.65 million). By contrast, increasing the contribution rate, π, to 7% (under $S4$), although increase public revenues (as compared to π of 5.7%), the amount raised through this increment remains inadequate to offset the large deficit (which stands at $916.33 million). Furthermore, both the EV and the GDP growth remain largely comparable to those obtained under $S3$ ($301.43 *vs*. $297.84 and 1.36% *vs*. 1.14%, respectively) (see Table 2). From a policy point of view, this indicates that increasing copayments (as opposed to a proportional increase in the contribution rate) can be more efficient in terms of reducing the government’s budgetary burden.

However, from an equity point of view, one may also consider another policy option that involves using a progressive contribution structure with a modest flat copayment rate. $S5$ introduces, in addition to a copayment rate of 18.5%, disproportionality in contributions across the SES groups. Accordingly, the poorest 20% are exempted, the second poorest quintile continues to pay the current rate of 5.7%, while the middle-income quintile pays 7% and the richest two quintiles contribute 7.5% and 8.5%, respectively. The computation of EV for each equivalent income quantile can also help revealing the potential variation in the WTP across SES groups.

Table 3 shows that the EV varies significantly across the different SES groups of the population (ranging from to $96.31 for the poorest quintile to $530.37 for the richest quintile). This reflects higher WTP at the higher income level. Quite interestingly, the relative change in social welfare (as measured by the EV/y)[8] is found to be much higher at the lower-income levels (as compared with $S2$ where the proportional contribution rate yields similar ratio of EV/y across income groups). This indicates that while the richest groups are still WTP more for the proposed insurance scheme (five times higher) than the poorest, the relative change in individual welfare (EV/y) is much higher for the lower-income groups as compared with $S3$ where proportional structure of contribution is used along with copayment (see Table 3). This is in line with the core of the risk-pooling mechanism, which involves cross-subsidies between high- and low-risk individuals (risk-subsidies) and high- and low-income individuals (equity-subsidies). Furthermore, such policy option can help enhance

[8] See equation number 9.

economic growth (about 0.60%) and reduce the government budget deficit (by 1.04%). $S5$, thus, appears to be more equitable and efficient as compared with the other scenarios.

Insert Table 3 here

3.2 Dynamic Simulations

This sub-section simulates the effect of a gradual expansion of the two dimensions of UHC over the timespan 2015-2030 while accounting for the dynamic changes in the demographic and epidemiological profile of the population. The following simulations explore five different scenarios ($\acute{S}1$- $\acute{S}5$) under the assumption of fixed depth.

$\acute{S}1$ focuses on the effects of a gradual expansion of the breadth of coverage (from 65% in 2015 to 80% in 2020, then to 90% in 2025 until reaching the full coverage in 2030) with the width being set at the initial rate of 50% of the total medical costs. $\acute{S}2$ allows for a parallel expansion of the breadth (as in $\acute{S}1$) and the width (from 50% to 60% of the total medical costs). $\acute{S}3$ conducts the same analysis as $\acute{S}2$ but assumes an increase of copayment rate 21.4%. $\acute{S}4$ introduces progressive contribution structure in the second phase and exempts the poorest income quantile from the copayments. Lastly, $\acute{S}5$ examines the impact of a change in the epidemiological profile of the population.

Results of the dynamic analysis are summarized in Table 4. It is worth noting, first, that the gain in social welfare is higher as the width of coverage is expanded. For instance, an expansion of the width from 50% to 60% of the total medical costs increases the EV from \$183.16 in $\acute{S}1$ to \$261.70 in $\acute{S}2$. This may suggest that individuals are willing to pay more to get higher degree of financial protection against the risk of incurring medical costs. Remarkably, unlike the static simulation scenarios, expanding health coverage appears to induce further economic growth (in real terms). For instance, GDP grows by 4.35% (in $\acute{S}1$), but such growth is further enhanced in $\acute{S}2$ (a growth by about 7.0%) where both breadth and width of coverage are expended. The *UHC-induced economic growth* holds even under $\acute{S}5$ where the burden of medical costs is higher due to the assumed epidemiological change.

Insert Table 4 here

The observed economic growth is mainly motivated by the stimulated increase in both C and G. The increase in C (e.g. by 1.03% in $\acute{S}1$) is mainly due to the *substitution effect* resulting from the large drop (by 21.15%) in private health expenditure at the full coverage rate. Compared with $\acute{S}1$, the parallel expansion in the breadth and width under $\acute{S}2$ results in an additional increase in G by 7.28%, thus culminating into a significant increase in the government budget deficit by 23.32% at the full coverage rate. Imposing a copayment rate, κ, of 5% ($\acute{S}3$) helps reduce the budget deficit by 1.90% in the first phase. However, such deficit tends to increase, though at a lower rate compared with $\acute{S}2$, as the breadth of coverage is expanded (an increase by 6.70% and 8.60% in the second and third phases, respectively). Introducing a progressive payment structure in the second and third phases ($\acute{S}4$) would yield a lower burden on the government budget (an increase in the deficit by only 2.60% at full coverage rate).

As expected, the change in the epidemiological profile in $\acute{S}5$ would lead to further increase in G (6.28% at the full coverage rate). However, maintaining progressivity and copayments can help counterbalance the budgetary deficit (an increase by only 3.37%). As far as the social gain is concerned, it is of interest to compare the estimated values of EV across SES groups between $\acute{S}4$ and $\acute{S}5$. Table 5 shows that the estimated EV values are always higher in $\acute{S}5$ (i.e., under epidemiological change) as compared with $\acute{S}4$, regardless of the SES. While this confirms again the higher WTP at the higher income-level, it shows that individuals are willing to pay more given the higher probability of need for medical care. Once again, results on the relative change in social welfare (EV/y) shows similar trends to those found in the static simulation: progressive payment structure yields higher ratio of EV/y at the lower-income levels compared with the higher income levels.

Insert Table 5 here

4. Discussion

This paper has sought to examine the conduciveness of the macro-fiscal conditions for the expansion of the breadth and width of the UHC and its impact on social welfare in the case of the oPt. The question of whether (and to what extent) UHC-oriented reform is economically feasible and fiscally sustainable has been tackled using a microsimulation technique within a computable general equilibrium framework (CGE). This allowed to assess ex-ante the potential impacts of UHC program on social welfare, using the concept of equivalent variation, and on the macro-economic performance, using the concept of fiscal sustainability. Some interesting findings and key implications that emerge from our analysis are worth making in the lights of the practical questions raised above. However, before going through the main results, some important theoretical-empirical issues pertaining to the assumptions underlying our model, particularly, the agents’ behaviors and the choice of policy scenarios, are worth highlighting. First, while agents’ expectations vis-à-vis future policy adjustments can range from myopic to perfect foresight, our model assumes that individuals do not anticipate future fiscal adjustments. Consequently, they do not alter their consumption and saving behaviors. Obviously, this is not an unobjectionable assumption (Lucas 1976; Barro 1974). The fiscal deficit resulting from the introduction of UHC-oriented reform may induce fiscal adjustments (e.g., an increase in tax on income or consumption), which may, in turn, affect individuals’ consumption decisions. However, for the sake of the present analysis, we assume that agents recognize that the Palestinian Authority (PA) has a limited fiscal capacity to increase taxes in the short-run (reasons are discussed below). In the absence of any fiscal policy adjustment, we therefore considered that the government can only alter copayments and premiums of insurance. While copayments are linked to the need of health care, hence are expected to generate less revenues that premiums, the latter can be structured in a proportional or a progressive manner.

Another assumption also relates to the specification chosen for the utility function. While other functional forms are available in the literature, the CES specification appeared to better fit our dataset, which are characterized by an elasticity of substitution of less than one (i.e., complementarity between health spending and spending on all other goods). This implies that UHC would lead to an increase in both the utilization of healthcare, h and all other goods and services, x. Applying different specifications of utility functions could have yielded different results, thus, different policy implications. This suggests that the path towards UHC is rather country specific hinging on both individuals’ behavior *vis-à-vis* the proposed scheme and the conducive macroeconomic conditions.

Under conditions, simultaneous expansion of both the breadth and width of coverage appears to induce economic growth. In our model, the two main channels through which GDP growth is affected by UHC are the household consumption expenditure (C) and the government expenditure (G). While expanding the health coverage implies a reduction in household equivalent income by the amount of contributions and copayments (the income effect), such coverage allows households to reallocate their resources (the substitution effect). Similarly, expanding health coverage implies an increase in the share of public health expenditure, thus, in G. Importantly, the magnitudes of changes in both components of the GDP (C and G) are affected by the combination of the financing-mix under consideration. In particular, increasing the contribution rates (e.g., from the current rate of 5.7% to 7.0%) appears to lead to relatively higher economic growth compared to the case where copayments are increased or the case where progressive contributions rate are used. This is because copayments affect the two channels of GDP: increasing C through the substitution effect, which offsets the income effect, and decreasing G through the reduction in public expenditure on health. However, raising contributions can only affect C through income effect.

While the above results illustrate the mechanisms through UHC may affect economic growth, some may argue that it is not the function of the health insurance system to enhance economic growth. The question of *why economic growth matters for UHC* can be illustrated in the context of highly constraint budget setting, where GDP growth is shown to play an enabling role for facilitating domestic resource mobilization, thus, creating additional fiscal space specifically for health sector (Gottret and Schieber 2006; Heller 2005).

Turning to the budgetary impact of UHC, one important question that this paper sought to address is whether (and under what conditions) would UHC be fiscally sustainable. Our results showed that under the assumptions of full coverage of the population and 50% of the medical care costs, the UHC would have no negative impact on the fiscal deficit. However, expanding the width to 60% of the total costs would increase the government fiscal deficit by about 23%. Under conditions, fiscal deficit would represent about 14% of the GDP, of which about 2% would be due to UHC spending. The latter would absorb about 10% of GDP, 15% of total public spending, and 57.4% of public spending on health. As argued elsewhere, UHC, which involves expanding coverage along all three dimensions: the breadth, width and depth, shall be designed in the context of a government’s available fiscal space and financing options (Hanvoravongchai 2013; Guerard et al. 2011; Tandon and Cashin 2010). In effect, the issue of fiscal space arises as one of the main challenges that may severely limit the ability of countries to progress towards the UHC target (Gottret and Schieber 2006). The finding that the expansion of the GHI pool can generate further economic growth implies that some of the fiscal deficits, which cannot be financed through the mobilized revenues alone, could be funded through the additional fiscal space generated by economic growth. Calculations based on our results suggest that at least an additional annual growth of 3.0% would be needed to offset the expected budgetary effect of the 60% expansion in the width.

Of course, there are other ways to generate additional fiscal space to help scale up health coverage and to ensure its financial sustainability (e.g., tax measures, reprioritization of government budget, grants and foreign aid and power of seigniorage) (Heller 2005). Yet, in the particular context of the oPt, it is important to highlight the fact that not all these measures are feasible (Abu-Zaineh et al. 2009). Indeed, the capacity to increase allocations from general tax revenues to the health sector is highly constrained due to the narrow tax base and the lack of sovereignty over all tax revenues (e.g., about 70 to 75% of the total tax revenues are levied by Israel (PMA 2014)). Nonetheless, despite the vital role that external funding has played in supporting the PA budget, such source has been shown to be highly unpredictable and inflexible for dealing with country’s priorities (Mataria et al. 2009).

All of these factors need to be taken into consideration if a parallel expansion in the breadth and width of health coverage is attempted. As elsewhere (Lagomarsino et al. 2012; Mtei et al. 2012; Savedoff and WHO 2004) our results showed that insurance contributions and copayments alone will be inadequate to ensure the long-run financial sustainability of UHC. However, using the concept equivalent variation (EV), our results suggested that individuals are willing-to-pay more to enhance their social welfare as represented by the higher degree of financial protection against the risk of illness and the rising medical care costs associated with the epidemiological changes. This is, even so, when a progressive contribution structure is introduced. Such a structure appears to enhance both functions of the risk-pooling: risk-subsidies (between high- and low-risk individuals) and equity-subsidies (between high- and low-income individuals).

5. Conclusion

Akin to other developing countries, the oPt has considered expanding the GHI scheme in the view of attaining UHC. However, contrary to other countries’ experiences, where the UHC program expenditures are caught-up by other complementary sources of public financing, the scope of fiscal space in the oPt is rather narrow. Under conditions, an assessment of UHC within a broader macro-fiscal context was in order. While providing some evidence in favor of UHC, our results alert on the sizable budgetary impact of a simultaneous expansion of coverage along the three dimensions of the UHC: breadth, width, and depth. Clearly, in the absence of any tax reform, such budgetary burden might reduce the fiscal space across sectors. However, in the context of limited fiscal space and financing options, a set of policy measures, which may help achieve UHC in a financially sustainable manner, can be advanced. First, given the budgetary impact of expanding both the breadth and width of UHC, policy-makers may need to specify UHC targets, mainly the spectrum of services to be covered (the depth) and the level of remunerations (the width). Indeed, our analysis considered a benefit package that includes a wide range of services. However, in order to avoid the risk of fiscal unsustainability resulting from, for instance, open-ended comprehensive entitlements, there is a need to reprioritize, rationalize and cost-out the range of services included in the benefit package. Second, a gradual and planned, rather than ad hoc, expansion of UHC requires identifying a sliding scale of contributions that takes into account individuals’ willingness-to-pay. Our results show that a gradual expansion of the population coverage of 60% of health care costs with progressive contributions structure can be the best policy in terms of sustainability as well as the welfare effects of UHC program. Third, although foreign aid is not a sustainable source for generating fiscal space for health, the PA can still redirect some of the external resources towards subsidizing the coverage of the worse-off groups of the population.

As mentioned above, our results are based on specific assumptions underlying the CGE model, mainly, the absence of rational expectations on the part of individuals and the absence of fiscal adjustments on the part of the government. Relaxing these two assumptions may well require restructuring the CGE modeling to internalize the possible fiscal adjustments into the consumers’ decisions. Expectedly, the impact of UHC reform on individuals’ welfare may still be positive but less than the values obtained from the standard (myopic) model since individuals may decrease (increase) their current consumption (savings) in order to pay for the future taxes.

Available literature shows that individuals with perfect foresight have lower welfare gains, in the short-run, compared to myopic individuals, but eventually, both will converge to the same level of welfare over the long-run (Weidenbaum, Raboy, and Christian Jr 2012; Ballard 1987). Accordingly, the impact on GDP growth may be rather mixed depending on the change in agents’ behavior. Lastly, another issue that calls for further research relates to the possible inter-generational inequality resulting from the transfer of the current fiscal deficit induced by the UHC reform to future generations.

References

Abu-Zaineh, Mohammad. 2009. “Contribution to the Analysis of Health Equity: Measurement and Explanation of Inequality and Inequity in the Healthcare Sector in the Context of Developing Countries: The Palestinian Case.”

Abu-Zaineh, Mohammad, Awad Mataria, Stéphane Luchini, and Jean-Paul Moatti. 2009. “Equity in Healthcare Finance in Palestine: The Triple Effects Revealed.” *Journal of Health Economics* 28 (6): 1071–80.

Auerbach, Alan J., and Laurence J. Kotlikoff. 1981. *An Examination of Empirical Tests of Social Security and Savings*. National Bureau of Economic Research Cambridge, Mass., USA.

Ballard, Charles L. 1987. “Tax Policy and Consumer Foresight: A General Equilibrium Simulation Study.” *Economic Inquiry* 25 (2): 267–84.

Barro, Robert J. 1974. “Are Government Bonds Net Wealth?” *Journal of Political Economy* 82 (6): 1095–1117.

Chanel, Olivier, Khaled Makhloufi, and Mohammad Abu-Zaineh. 2016. “Can a Circular Payment Card Format Effectively Elicit Preferences? Evidence From a Survey on a Mandatory Health Insurance Scheme in Tunisia.” *Applied Health Economics and Health Policy*, 1–14.

Chipman, John S., and James C. Moore. 1980. “Compensating Variation, Consumer’s Surplus, and Welfare.” *The American Economic Review*, 933–49.

Dye, Christopher, John C. Reeder, and Robert F. Terry. 2013. “Research for Universal Health Coverage.” *Science Translational Medicine* 5 (199): 199ed13-199ed13.

Giacaman, Rita, Hanan F. Abdul-Rahim, and Laura Wick. 2003. “Health Sector Reform in the Occupied Palestinian Territories (OPT): Targeting the Forest or the Trees?” *Health Policy and Planning* 18 (1): 59–67.

Giedion, Ursula, Edurado Andrés Alfonso, and Yadira Díaz. 2013. *The Impact of Universal Coverage Schemes in the Developing World: A Review of the Existing Evidence*. World Bank Washington, DC.

Gottret, Pablo Enrique, and George Schieber. 2006. *Health Financing Revisited: A Practitioner’s Guide*. World Bank Publications.

Guerard, Yves, Mitch Wiener, Claudia Rokx, George Schieber, Pandu Harimurti, Eko Pambudi, and Ajay Tandon. 2011. “Actuarial Costing of Universal Health Insurance Coverage in Indonesia.” *Health Nutrition Population Discussion Paper, World Bank, Washington, DC*.

Hanvoravongchai, Piya. 2013. “Health Financing Reform in Thailand: Toward Universal Coverage under Fiscal Constraints.” http://hdl.handle.net/10986/13298.

Heller, Mr Peter S. 2005. *Understanding Fiscal Space*. International Monetary Fund.

Ihori, Toshihiro, Ryuta Ray Kato, Masumi Kawade, and Shun-ichiro Bessho. 2011. “Health Insurance Reform and Economic Growth: Simulation Analysis in Japan.” *Japan and the World Economy* 23 (4): 227–39.

Kelsall, Tim, Tom Hart, and Edward Laws. 2016. “Political Settlements and Pathways to Universal Health Coverage.” https://www.odi.org/sites/odi.org.uk/files/resource-documents/10382.pdf.

Lagomarsino, Gina, Alice Garabrant, Atikah Adyas, Richard Muga, and Nathaniel Otoo. 2012. “Moving towards Universal Health Coverage: Health Insurance Reforms in Nine Developing Countries in Africa and Asia.” *The Lancet* 380 (9845): 933–43.

Lucas, Robert E. 1976. “Econometric Policy Evaluation: A Critique.” In *Carnegie-Rochester Conference Series on Public Policy*, 1:19–46. North-Holland.

Mas-Colell, Andreu, Michael Dennis Whinston, and Jerry R. Green. 1995. *Microeconomic Theory*. Vol. 1. Oxford University Press New York.

Mataria, Awad, Rana Khatib, Cam Donaldson, Thomas Bossert, David J. Hunter, Fahed Alsayed, and Jean-Paul Moatti. 2009. "The Health-Care System: An Assessment and Reform Agenda." *The Lancet* 373 (9670): 1207–17.

Mills, Anne, John E. Ataguba, James Akazili, Jo Borghi, Bertha Garshong, Suzan Makawia, Gemini Mtei, Bronwyn Harris, Jane Macha, and Filip Meheus. 2012. "Equity in Financing and Use of Healthcare in Ghana, South Africa, and Tanzania: Implications for Paths to Universal Coverage." *The Lancet* 380 (9837): 126–33.

MoH, Palestinian Ministry of Health. 2013. "National Health Accounts."

Mtei, Gemini, Suzan Makawia, Mariam Ally, August Kuwawenaruwa, Filip Meheus, and Josephine Borghi. 2012. "Who Pays and Who Benefits from Healthcare? An Assessment of Equity in Healthcare Financing and Benefit Distribution in Tanzania." *Health Policy and Planning* 27 (suppl 1): i23–34.

OECD. 1982. "The OECD List of Social Indicators."

PCBS, Palestinian Central Bureau of Statistics. 2004. "The Palestinian Health Expenditure and Utilization Survey." Palestinian Central Bureau of Statistics.

PCBS, and MoH. 2013. "National Health Accounts." Palestinian Central Bureau of Statistics and Ministry of Health.

PMA. 2014. "Revenues, Expenditures and Financing Sources of PNA Fiscal Operations." Palestine.

Reddy, K. Srinath, Vikram Patel, Prabhat Jha, Vinod K. Paul, AK Shiva Kumar, Lalit Dandona, and Lancet India Group for Universal Healthcare. 2011. "Towards Achievement of Universal Healthcare in India by 2020: A Call to Action." *The Lancet* 377 (9767): 760–68.

Savedoff, William D., and WHO. 2004. "Tax-Based Financing for Health Systems: Options and Experiences."

Somanathan, Aparnaa, Ajay Tandon, Huong Lan Dao, Kari L. Hurt, and Hernan L. Fuenzalida-Puelma. 2014. *Moving toward Universal Coverage of Social Health Insurance in Vietnam: Assessment and Options*. World Bank Publications.

Tandon, Ajay, and Cheryl Cashin. 2010. *Assessing Public Expenditure on Health from a Fiscal Space Perspective*. World Bank.

Tang, Shenglan, Jingjing Tao, and Henk Bekedam. 2012. "Controlling Cost Escalation of Healthcare: Making Universal Health Coverage Sustainable in China." *BMC Public Health* 12 (1): 1.

United Nation. 2015. "Probabilistic Population Projections Based on the World Population Prospect: The 2015 Revision." http://esa.un.org/unpd/ppp/.

Wagstaff, Adam, Daniel Cotlear, Patrick Hoang-Vu Eozenou, and Leander R. Buisman. 2016. "Measuring Progress Towards Universal Health Coverage: With an Application to 24 Developing Countries." *Oxford Review of Economic Policy* 32 (1): 147–89.

Weidenbaum, Murray L., David G. Raboy, and Ernest S. Christian Jr. 2012. *The Value-Added Tax: Orthodoxy and New Thinking*. Springer Science & Business Media.

WHO. 2015a. "Report on the Expert Consultation on Expanding Universal Health Coverage to the Informal Sector and Vulnerable Groups in the Eastern Mediterranean Region." World Health Organization.

WHO, World Health Organization. 2010. *WORLD HEALH REPORT (The): Health Systems Financing: The Path to Universal Coverage*. World Health Organization.

———. 2015b. *Health in 2015: From MDGs, Millennium Development Goals to SDGs, Sustainable Development Goals*. World Health Organization.

———. 2016. “Palestine Health Profile 2015.”

World Bank. 2008. “Health Financing Reform and the Rationalization of Public Sector Health Expenditure.”

Tables

Table 1: Estimated *vs*. real values of the main macroeconomic variables in 2011 (in USD million)

Indicators	Household Consumption expenditure	Government Revenue	Government Expenditure	Fiscal Deficit	Gorss Domestoc Product (GDP)
Estimated data	10742.21	3043.99	3570.81	-526.82	13875.21
Real data	9432.00	3002.03	3811.00	-808.97	12565.00

Table 2: Static Simulation Scenario of UHC

	UHC Scenario		*S1*			*S2*			*S3*			*S4*			*S5*
UHC Reform	**Breadth**	Population covered %)	80	90	100	80	90	100	80	90	100	80	90	100	100
	Width	*(1-κ)(1-o) (%)*		50			60			60			60		60
	Depth	(1-o) (%)		70			70			70			70		70
	Copayment rate (%)			28,5			14,3			21,4			14,3		18,5
	UHC Contribution (%)			5,7			5,7			5,7			7		*Progressive*
Main indicators	**Household Consumption expenditure (C%)**		-1,18	-1,89	-2,60	-1,25	-2,01	-2,76	-1,22	-1,95	-2,69	-1,47	-2,37	-3,27	-3,48
	Direct out-of-pocket expenditure (%)		-7,39	-12,24	-17,09	-8,80	-14,59	-20,38	-8,09	-13,40	-18,71	-8,91	-14,77	-20,63	-19,78
	Expenditure on other goods and services (%)		0,80	1,41	2,03	1,16	2,01	2,86	0,97	1,70	2,43	0,91	1,59	2,28	1,72
	UHC Revenues (in million USD)		507,16	845,27	1183,38	444,82	741,36	1037,90	476,43	794,05	1111,66	462,35	770,58	1078,81	1135,89
	UHC Spending (in million USD)		403,64	676,29	948,95	514,61	861,24	1207,87	456,96	765,16	1073,36	507,32	849,09	1190,86	1101,90
	Total Government Revenue (%)		14,68	24,73	34,78	12,87	21,70	30,54	13,78	23,23	32,68	13,35	22,52	31,68	33,31
	Total Government Expenditure (%)		9,91	16,53	23,15	12,61	21,03	29,46	11,20	18,69	26,18	12,42	20,72	29,02	26,84
	Fiscal Deficit (%)		-10,70	-18,87	-27,04	11,51	18,15	24,79	0,07	-0,91	-1,90	8,41	12,99	17,56	-1,04
	Gorss Domestoc Product (GDP %)		-1,32	-0,44	0,46	-0,70	0,60	1,91	-1,03	0,05	1,14	-0,94	0,21	1,36	0,59
	Equivalent Variation (EV in USD)			254,03			345,52			297,84			301,43		[96,31: 530,37]

Table 3: Equivalent variation and relative change in individual social welfare across SES groups under $S3$ and $S5$

Income quintile	Average income	**S3** (*proportional rate of 5.70%*)		**S5** (*progressive rate*)		
		EV (in USD)	**EV/y**	**Contribution**	**EV (USD)**	**EV/y**
Poorest 20%	525.714	56.776	0.125	0.00%	96.306	0.183
40%	1074.350	109.910	0.119	5.70%	116.874	0.109
60%	1673.654	174.611	0.121	7.00%	159.502	0.095
80%	2635.401	279.303	0.123	7.50%	239.783	0.091
Richest 20%	6590.017	708.102	0.125	8.50%	530.368	0.080

Table 4: Dynamic Simulation Scenario of UHC

	UHC Scenario		***S'1***			***S'2***			***S'3***			***S'4***			***S'5***		
UHC Reform		Year	*2020*	*2025*	*2030*	*2020*	*2025*	*2030*	*2020*	*2025*	*2030*	*2020*	*2025*	*2030*	*2020*	*2025*	*2030*
	Breadth	Population covered %)	80	90	100	80	90	100	80	90	100	80	90	100	80	90	100
	Width	*(1-κ)(1-ο) (%)*		50			60			60			60			60	
	Depth	(1-ο) (%)		70			70			70			70			70	
	Copayment rate (%)			28,5			14,3			21,4			21,4 %(poorest 20% exempted)			21,4%(poorest 20% exempted)	
	UHC Contribution (%)			5,7			5,7			5,7		5,7	*Pogressive*		5,7	*Progressive*	
Main indicators	**Household Consumption expenditure (C%)**		3,62	2,95	1,45	3,04	2,72	1,03	3,10	2,83	1,24	3,09	2,29	0,47	3,68	3,20	1,62
	Direct out-of-pocket expenditure (%)		-2,60	-11,35	-17,92	-5,91	-13,68	-21,15	-5,19	-12,50	-19,51	-5,21	-12,83	-19,97	-4,59	-11,85	-18,65
	Expenditure on other goods and services (%)		5,70	8,11	8,95	6,03	8,63	9,61	5,86	8,36	9,26	5,86	7,74	8,38	6,43	8,63	9,46
	UHC Revenues (in million USD)		671,33	1089,61	1703,42	506,75	956,75	1496,76	542,56	1024,06	1601,41	541,48	1078,34	1694,16	572,22	1134,31	1778,68
	UHC Spending (in million USD)		365,55	855,85	1316,03	583,26	1084,48	1664,06	519,02	965,93	1483,80	520,95	949,18	1457,88	558,78	1018,11	1561,98
	Total Government Revenue (%)		16,62	7,56	5,97	12,63	5,38	3,57	13,48	6,48	4,78	13,45	7,34	5,83	14,31	8,39	6,95
	Total Government Expenditure (%)		7,41	4,98	3,85	11,65	8,18	7,28	10,39	6,52	5,50	10,43	6,27	5,23	11,20	7,26	6,28
	Fiscal Deficit (%)		-29,34	-6,95	-5,35	7,76	21,14	23,32	-1,90	6,70	8,60	-1,61	1,32	2,60	-1,21	2,06	3,37
	Gorss Domestoc Product (GDP %)		3,24	4,31	4,35	3,91	5,88	7,00	3,55	5,06	5,62	3,56	4,44	4,71	4,54	5,90	6,74
	Equivalent Variation (EV in USD)		253,07	230,93	183,16	341,67	315,65	261,70	295,58	271,65	220,98	[65: 703]	[100: 407]	[91: 280]	[93: 1024]	[129: 707]	[117: 548]

Table 5: Equivalent variation and relative change in individual social welfare across SES groups under $\acute{S}4$ and $\acute{S}5$

Scenario	S'4: progressive rate						S'5: progressive rate with epidemiological change					
Income quintile	EV (in USD)			EV/y			EV (USD)			EV/y		
	2020	2025	2030	2020	2025	2030	2020	2025	2030	2020	2025	2030
Poorest 20%	65.001	99.517	90.594	0.118	0.171	0.148	93.399	128.541	116.593	0.169	0.221	0.191
40%	109.029	99.951	80.789	0.097	0.084	0.065	155.197	144.446	120.531	0.137	0.122	0.097
60%	173.244	130.859	99.875	0.098	0.071	0.051	252.093	205.784	166.774	0.143	0.111	0.086
80%	277.149	193.174	143.587	0.100	0.066	0.047	403.944	313.001	250.572	0.146	0.108	0.082
Richest 20%	702.828	406.920	279.516	0.101	0.056	0.037	1024.094	707.193	547.617	0.148	0.097	0.072