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journal homepage: www.elsevier.com/locate/econmodSubsidizing healthcare in the presence of market distortions[☆]Sarbjait Chaudhuri^{a,*}, Jayanta Kumar Dwibedi^b, Anindya Biswas^c^a Dept. of Economics, University of Calcutta, India^b Dept. of Economics, B.K.C. College, Kolkata, India^c Division of Business, Spring Hill College, Mobile, USA

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ABSTRACT

The paper develops a three-sector full-employment general equilibrium model for a small open developing economy with exogenous labour market imperfection and a non-traded sector providing healthcare services, the consumption of which generates positive externalities. Our main objective is to show that the optimal consumption subsidy to healthcare, if solely judged from the standpoint of economic growth, is strictly positive (zero) when the production technology of the healthcare sector is of the variable (fixed) coefficient type. However, in the variable coefficient case, the optimal per capita expenditure on healthcare crucially hinges on the degree of labour market imperfection and the quality of services provided by the healthcare sector. The latter result can possibly be considered as a theoretical justification why the magnitude of per capita public spending on healthcare services is significantly lower in the developing countries compared to that in the developed nations. Besides, using the Sen's (1974) index of social welfare that takes into consideration both the growth and income inequality aspects, we have proved that the optimal health subsidy is positive irrespective of the nature of production technology of the healthcare sector. Furthermore, most of these results are found to be valid even in the presence of Harris-Todaro type unemployment. Finally, the results lead to a few important policy implications in the context of the developing countries.

1. Introduction and motivation

A well-known textbook result in the theory of welfare is that in a small open economy with positive consumption externalities, a subsidy should be provided to consumers to increase economic efficiency. Positive (negative) externalities create distortion that denies the economy of its first best i.e. Pareto optimal solution. Hence the economic agents that emanate positive (negative) externalities should be subsidized (taxed) for attaining the second-best solution. A pertinent question at this juncture is whether the policy conclusion would remain the same even in the presence of another distortion e.g. factor market imperfection. An answer to this question is available in the literature e.g. Lipsey and Lancaster (1956), Bhagwati (1971) and Batra (1973) which is as follows. In an economy that is plagued with multiple distortions, a single policy instrument designed to correct a particular distortion might increase the degree(s) of other distortion(s). Hence, the net outcome on welfare could be ambiguous. However, it has remained unanswered whether the efficacy of the public policy that targets externalities anyway hinges on the degree of factor market distortion, the magnitude of externalities, and the production technol-

ogy of the commodity whose consumption or production creates externalities.

We seek to address these issues theoretically using a three-sector general equilibrium model reasonable for a developing economy with a non-traded healthcare sector and labour market distortion. Consumption of healthcare services emanates positive externalities because it increases the efficiency of the workers and hence the effective labour force of the economy measured in efficiency unit. We have proved that the socially optimal consumption subsidy on healthcare, if judged solely from the perspective of economic growth, is strictly positive despite the presence of labour market distortion provided the technology of production in the healthcare sector is of the variable coefficient type. However, in the fixed-coefficient case, the optimal subsidy is strictly zero. Nevertheless, the magnitude of the optimal per capita public spending on healthcare crucially depends on the extent of labour market imperfection and the quality of services provided by this sector. Because it is a purely theoretical exercise empirical verification of the results using econometric tools is completely beyond its scope and has therefore been left out. However, we have made a quantitative analysis using simulation technique to show that the results hold for a

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wide range of parameter values.

Because apart from promoting economic growth, the public expenditure on healthcare also plays a crucial redistributive role, we have then proceeded to consider the Sen's (1974) index that takes into account both the growth and the income inequality aspects in the measure of social welfare. Our analysis has found that the optimal health subsidy is positive irrespective of the nature of technology in the healthcare sector.

1.1. Some stylized facts and a brief survey of existing literature

Governments across countries whether developed or developing spend substantial amounts of their budgets in providing health subsidies. For example, as per the World Bank dataset (The World Bank, 2014) US spent 8.3 percent of its gross domestic product (GDP) on healthcare in 2014 while the world average was 5.99 percent. The corresponding figures for UK, Germany and Japan were 7.6, 8.7 and 8.6 percent, respectively. On the other hand, the developing countries in general spent much less on healthcare compared to the developed world. For example, China, India and Bangladesh spent only 3.1, 1.4 and 0.8 percent of their respective GDP in providing subsidy on health.¹ The figures for per capita public expenditure on healthcare are also substantially higher in developed countries compared to those in developing nations. This difference may arise due to the fact that in a developing country like India the government has to spend a substantial amount of its resources on redistributive programs with a view to mitigate poverty and income inequality. In this context, it is important to note that public expenditure on healthcare in developing countries by itself plays a redistributive role. This is because the poor people can spend only a meager amount from their own pockets on health. Public expenditures on both preventive and curative healthcare services help them much in getting at least some access to healthcare services and thereby increasing their productive power.²

There are quite a few number of papers in the literature e.g. Lakdawalla and Sood (2013), De Fraja (2008), Blomquist and Christiansen (1999), Chiu (1997), Aloj and Tournemaine (2011), vanZon and Muysken (2001) etc. that have discussed issues like pricing and financing of healthcare, linkage between healthcare and health insurance, political economy aspects of publicly provided healthcare, pollution and healthcare externalities and tax policy, the relationship between preference for healthcare services and economic growth etc. We come across works by Chaudhuri (2014) and Chaudhuri and Mukhopadhyay (2014) that have analyzed the welfare consequence of FDI flows in the developing countries in the presence of positive externalities of healthcare, labour market, and trade distortions. However, we do not come across any work that has examined the efficacy of the consumption subsidy policy to take care of the healthcare externalities in the presence of other distortion(s) and suggest measures to increase economic efficiency.

In this paper, we have tried to fill the above vacuum in the literature in terms of a 3-sector general equilibrium model with a non-traded healthcare sector and labour market distortion. The results of this exercise, as stated earlier, have some important policy implications for a developing economy like India. Finally, this analysis probably provides a theoretical justification why the magnitude of per capita public spending on healthcare services is significantly lower in the developing countries relative to that in the developed nations.³

¹ See <http://data.worldbank.org/indicator/SH.XPD.PUBL.ZS>

² These aspects have been discussed in detail in Musgrove (1999), Self and Grabowski (2003) etc.

³ There's no gainsaying that in certain small developed countries also, there could be factor market distortions. The present analysis is equally applicable to the case of those economies too.

2. The model

Let us consider a small open developing economy with three sectors: sector 1, sector 2 and sector G .^{4,5,6} All the three sectors use labour (L) in production. Besides, sector 1 and sector 2 use capital of type K while sector 3 uses capital of type N .^{7,8} Sector 1 and sector 2 are exports sector and import-competing sector, respectively. Sector 1 produces an agricultural commodity (X_1) while sector 2 produces a manufacturing commodity (X_2). On the other hand, sector G is a non-traded sector that produces healthcare services, X_G which is consumed domestically.⁹

In reality both private and public healthcare systems coexist and their objectives are quite different. The public healthcare system in the developing countries, designed to provide universal access to healthcare services at low cost, is seriously lacking both in quantitative and qualitative terms. The public health sector is plagued by inefficiencies and lack of physical infrastructure, triggering the emergence of private participation in the provision of healthcare. For example, the private sector accounts for around 80 per cent of healthcare delivery in India. An estimated 60 per cent of hospitals, 75 per cent of dispensaries, and 80 per cent of all qualified doctors are in the private sector (Chanda 2008). Serious inadequacy with respect to its vast demand and poor quality of services provided by the public system have made the private healthcare system as the major provider of healthcare services which is driven solely by profit-motive.

To capture some of these stylized facts we introduce sector G as the vertically integrated healthcare sector where the government's role can be encapsulated by the policy to provide subsidy to the people on the consumption of their medical services. Here healthcare is depicted as a private sector. It produces the number of patients treated charging a consultation fee or medical investigations at a charge. The number of machines or the size of specific capital stock (modern equipments, capital of type N) is exogenously given.

Workers in this paper are assumed to be homogeneous in line of many other papers in the literature on trade and development e.g. Khan (2007), Gupta (1993, 1994), Beladi and Marjit (1992a,b), Chaudhuri (2014, 2016), Chaudhuri and Biswas (2016) etc. The workers in the agricultural sector (an informal sector) earn the

⁴ A country which is engaged in international trade but is a price-taker at the world market is called 'a small open economy'. If a country's trade share in aggregate (global) trade volume is very small it cannot influence international prices of commodities. In this sense, it is termed as 'a small open economy'. In the literature on trade and development, a developing country is viewed as 'a small open economy' with its own peculiar characteristics. Although India is a large country with respect to both geographical area and population size, in the trade literature it is still considered as a small open developing economy because as per the World Development Indicators (2014), India's trade share was only 2.07 per cent in 2013. The corresponding figures for USA and China were 10.39 and 11.06 per cent, respectively. Hence, this analysis is applicable to India. Also see footnote 25 in this context.

⁵ Why we use a three-sector model instead of a two-sector one for the analytical purpose needs to be discussed. In a small open economy model, there must be at least two traded sectors: one exports and the other import-competing. The country's international trade must be balanced so that the value of exports and value of imports at world prices must be equal in equilibrium. It is important to mention that the Walras' law is taken care of by this trade balance condition. Now, if we want to introduce a non-traded sector in the form of healthcare, it has to come as the third sector. It implies that to analyze healthcare (a non-traded sector) in a small open economy setting we require considering at least a three-sector general equilibrium model.

⁶ Note that the third sector is termed as 'sector G '. The symbols 3 and G have been interchangeably used throughout the paper.

⁷ Capital of type N includes advanced and precision medical equipments like cardiac pacemakers and valves, defibrillators, and stents; electro-medical therapeutic, monitoring, and imaging devices and apparatus; in vitro diagnostics; and implantable orthopaedic and prosthetic devices and appliances.

⁸ Note that this is a short run model where the endowments of all of the basic factors of production have been assumed to be exogenous. However, one may carry out comparative statics with respect to changes in any of the factor endowments, e.g. capital of type N to examine its consequences on the key variables of the system.

⁹ Sector G is taken to be the vertically integrated healthcare sector because both private and public healthcare systems coexist in a developing country like, India.

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