The existence of supplier induced demand economics essay

Supplier induced demand (SID) can increase healthcare expenditure, increase financial pressures on the public health insurance programs, and increase the share of national resources spent on healthcare. And all of these can occur with few benefits for the health of the population. This is in direct opposition to healthcare policies which aim to improve health status of the population and increase access to care while controlling costs.

SID has been proposed as one of the possible reasons for the wide variation in costs of medical care across the United States [1]. For example, in 2006, the per capita spending for Medicare enrollees ranged from $5, 310 up to $16, 352 [2-3]. With the wide range in cost and the high expenditure, analysts also find that for every two dollars well spent, one is wasted [2-3]. With 17% of the U. S. GDP spent on healthcare, there will be insurmountable pressure to control waste and find policies that will enforce more efficient use of healthcare dollars.

Policies aimed towards the efficient allocation of resources in the healthcare system can gear to the demand side, supply side, or both [4]. If SID exists and has a significant influence on healthcare utilization and variation in price, then health policy constraints needs to be focused on the supply side in order to control physician behaviors. Reimbursement strategies such as Diagnostic Related Groups have been implemented to decrease incentives for physicians to overprescribe treatments and prolong stays in the hospital. However, there is still a lack of policy to truly constrain or put a cap on the overall expenditure. Since its proposed existence back in the 1970s, there is still much debate on whether SID truly exists or not. Due to its potential contribution to waste and inefficiency, the answer to the debate is important.

Therefore, the answer to how we can prove SID's existence can aid in the direct effort to control the ever-rising healthcare expenditures in the U. S.

Concept of supplier-induced demand:

One of the defining characteristics of the healthcare market is the large knowledge gap between the doctor (the agent) and the patient (the principal). Due to this asymmetry of knowledge and the high cost and difficulty of obtaining full knowledge, patients rely on doctors for advice on the proper amount and type of services needed to maximize their health. Doctors, on the other hand, want to maximize their own utility function. This utility function is dependent on their value of leisure-time, income, and the patient's well being [5]. The possibility for SID to exist is rooted in the presence of the asymmetric knowledge and the fact that physicians can be motivated by financial incentives in order to maximize their utility. Though, these two characteristics of the healthcare system gives rise to the possibility of SID, they do not guarantee its existence.

SID occurs when physicians use their superior knowledge to increase demand of medical services for patients beyond that is recommended or appropriate as deemed by the fully-informed patient. In this special case, supply and demand become interdependent, and the quantity demanded increases or the type of services provided changes. One of the first problems in identifying SID lies within the theory itself. When supply shifts and induces a subsequent shift in demand, it is uncertain how the price of the medical services will change (Appendix – Figure 1). In reality, we don't observe these shifts in the supply and demand curves. All that is observed in the healthcare market are the changes in the price and changes in the quantity of services

(Appendix – Figure 2 shows a possible scenario where price decreases and quantity increases). Even though in theory, price can decrease, the real concern is the inflation of price due to SID. This inflation of price can lead to inefficiency and waste. If the effect of SID is large, then a possible scenario is an increasing percentage of GDP will be spent on medical services with no subsequent change in health outcome or even a deterioration of health due to overutilization [6].

Another fundamental problem with measuring SID is that demand inducement lacks a clear definition. In particular, it doesn't account for the uncertainties involved in delivering care, the physicians' motives, nor the possible impacts of these uncertainties. As discussed before, physicians value their income and the patient's well-being. SID can be motivated by both. SID can occur when a physician, with no knowledge of the impact of cost on the patient, suggests more care than a patient will demand on their own due to price constraints. However, in such a case the physician has the patient's well-being in mind. If the patient is underutilizing, then SID, in this case will probably be beneficial for this patient as it increase their care to the appropriate amount. Such outcome of SID is not negative and can be looked upon favorably.

Furthermore, the words " appropriate" and " effective", which lack definitive models, often appear in different definitions of SID. Today's norm is to promote evidence-based practice, but this practice is not translated into appropriate and effective because every patient faces a different production function for health. Even though two patients can have the same illness, variation in treatment does not necessary mean they are inappropriate or

ineffective. The fine line between " appropriate" care and induced care that is inappropriate and will harm the patient's health is often blurred. The ethical problem with SID occurs when physicians are trying to maximize their utility function only to " generate personal gain", and this leads to worse health outcomes for the patients [6].

When a patient steps in the doctor's office, the uncertainties start piling up. There are clinical uncertainties, uncertainties in the agency-principal relationship, uncertainties pertaining to the patient's disease, uncertainties in the decision-making process, etc. There is no robust statistical method to control for all these uncertainties. Along with the blurred boundary between appropriate and inappropriate care, the body of literature that exists right now mostly use indirect measures to describe possible scenarios of SID. The healthcare market is also made up of many complex submarkets. There is indication that when care is complex, knowledge asymmetry is significant, and cost of obtaining additional information for patients is high, the possibility of SID increases. The flaw is that none of these guarantee SID.

Review of empirical findings

SID can only be measured indirectly because it is impossible to know the care patients choose to utilize when they have the same knowledge and information as a physician [7]. In general, studies measure " marginal" SID by examining the effect of practice and environmental changes on utilization patterns. The results from these studies vary depending on the type of treatment and the measure for SID. Even when studies show the presence of SID, there is no robust or reliable evidence on the likely magnitude of the effect. Most studies show a larger magnitude for surgical procedures and

very low magnitude for services rendered by primary care physicians. In general, the absolute value of the effect of SID on utilization is small compared with other variables that influence utilization such as health status. The empirical evidence includes those that:

measure the effect of doctor-population ratio on the quantity of services provided

measure the effect of doctor supply on " doctor-initiated visits"

measure the treatment patterns after changes in remuneration structures

measure the effect of other financial incentives on physician prescribing patterns

and measure inter-regional variations in utilization

Patient-Population Ratio

Measuring the correlation between doctor-population ratio and quantity of services utilized is the most common way to " test" for SID. Previous study in the 1970s from Australia shows that a 10% increase in the supply of general practitioner is associated with an increase in quantity of services utilized from 4. 6 to 5. 1% [8]. The same increase in the supply of specialists is associated with an increase of 7. 6% to 11. 9% [8]. More recent studies from the same author show a smaller increase in services utilized in the general practitioner group of 0. 4% [9].

This method provides a direct way of measuring the effect of the " flow of physician supply" on utilization patterns [10]. However, the interpretation of the results can be difficult. First of all, correlations do not demonstrate causality. The positive correlation can also indicate a normal reaction from the physician market reacting to an increase in patient demand due to increase in access or improvement in treatments [6]. The ratio only demonstrates the effects of physician supply, whereas the real concern in SID is the price of medical care and the income of physicians [10]. Even when physician-to-population ratio does not change, demand inducement can occur.

Studies using the patient-population ratio also depend on the statistical technique of regression analysis. However, patient-population ratio is very closely related to geographical location [6]. Since the independent variables cannot possibly capture all the geographical variables, the error term will be correlated with the patient-population ratio variable. Then, the statistical model of demand violates the endogeneity assumption. Endogeneity bias is usually related to the quality of the data itself. At last, studies using the ratio yield ambiguous results. As shown by Table 1 (Appendix), physician-population ratio can yield similar results in both the Neoclassical Model (assuming no demand inducement) and the Provider-Inducement Model [11]. Therefore, using physician-population ratio does not provide an adequate measure of SID

Doctor initiated visits

This approach uses survey data to determine how patient-population ratio affects the number of doctor-initiated visits. Wilensky and Rossiter use the National Medical Care Expenditure Survey in the U. S. and find that 40% of visits to doctors in 1977 are doctor-initiated [12]. In addition, they find only a small but statistically significant positive correlation between physician-population ratio and doctor-initiated visits [12]. The same study also shows that the probability of doctor-initiated visits increases with declining patient out-of-pocket spending [12]. One possible explanation is that when patients feel less financial burden from the cost of care, they tend to not question the physician on the amount of care utilized. In this circumstance, SID can occur more easily. Furthermore, the study shows that when there is a positive relationship between the physician-population ratio and the price of care [12]. In a competitive market, you will usually see price decreases with an increase in physician supply (Table 1 of Appendix). This evidence points to a high possibility of demand inducement. In Ireland, Tussing and Wojtowycz also show a strong positive correlation between physician-population ratio and the proportion of doctor-initiated return visits [13].

The correlation between physician-population ratio and doctor-initiated visits also run into criticisms. One of them is that the health status variable always shows a stronger correlation with physician-initiated visits compared with the physician-population ratio variable in these studies [10]. In fact, most studies on healthcare utilization show that health status is the most determinant of demand. Another problem is that doctor-initiated visits is not an " adequate proxy" for medically unnecessary induced visits [6]. The differentiation between physician-initiated and patient-initiated visits is also questionable

since these surveys usually ask patients to define the type of visits. Opponents of these studies also argue that SID can occur with inducement of physician visits, but it is most likely that physicians induce demand by ordering more tests during the visit. Therefore, doctor-initiated visits do not capture all the facets of SID. Other studies in the area also have shown that physicians do not induce demand for physician visits [14] or that these visits cannot actually be proven to be inappropriate.

Changes in remuneration structure

In the demand inducement theory, decreases in the price of services signals physicians to generate additional demand in order to generate income. Many studies test for demand inducement by looking at the direct effect of changing price on service utilization. In accordance with the SID theory, these studies test the hypothesis that when doctors' reimbursements decrease, they will prescribe more.

Gabel and Rice use Medicare data from Colorado during the late 1970s in ten different areas of Colorado to study the effect of freezing or decreasing payment levels on total program expenditure [15]. They find that those physicians in urban areas of the state are more likely to use greater number of surgical services and laboratory tests as well as more complex medical and surgical services [15]. However, this correlation can be attributed to geographical variation. Rice, in another study, examines how lowered reimbursement to higher paid urban general practitioners and increased reimbursement paid to others will affect utilization [14]. He find that a 1% decrease in reimbursement results in a 0. 6% increase in medical services

and a 0. 15% increase in surgical services [14]. Holahan and Scanlon also look at Medicare data and the effect of the fee freeze in the 1970s on utilization [16]. Their study show, during this time, total expenditures increase as quickly as before the fee controls and physicians increase utilization of services but also increase utilization of more complex services [16].

The main concern with cost control is controlling for overall expenditure. If SID exists, then price controls will be rendered useless because physicians can still increase their income by increasing utilization. Feldman and Sloan studied the effect of government fee control in Canada from 1971-1985 [17]. They analyzed aggregated data from all the provinces and found that expenditure decreased by 15. 9% with the fee control [17]. However, one of the weaknesses of this technique is that geographical variations exist [17]. Table 2 (Appendix) shows the fee changes for each province. In Table 2, only 4 provinces had " real" fee decrease. All but one of the provinces had decrease in activity per physician fall. Only two had a decrease in " real" billing per physician. Therefore, whether SID occurred in those provinces that showed increase in expenditure or fees is unknown due to geographical variation. The healthcare system is extremely complex, and multiple factors will determine total health expenditure. Therefore, to isolate physician-supply from all the other determinants is not possible [10]. Fee reimbursement changes do not provide a direct and definitive way to measure SID.

Other financial incentives

Other market conditions can also provide possible scenarios of SID. Gruber and Owings examined how fertility decline (in the 1970s) affected obstetrican/gynecologist behaviors [18]. They found that during the period of fertility decline, caesaran deliveries, the more expensive delivery method, increased from 5. 5% to 23. 5% [18]. They found that a 10% decrease in fertiliyt is associated with a 1% increase in the likelihood of caesarean delivery [18]. This can provide proof of SID since during the study period there was limited coverage of normal childbirth and full coverage of c-sectioin. Therefore doctors have the financial incentive to increase caesarean births. However, another explanation could be that women were having children at later age which increases the likelihood of using caesarean [6].

Regional variation in utilization

Some studies maintain that variation in medical procedures and surgery across regions can be explained by demand inducement for doctors. Richardson and Peacock found significant differences in utilization rates as predicted by age and sex compared with the observed utilization rates in Victoria, British Columbia [19]. They found that total hip replacement exceeded its predicted variation by 110% and colonoscopy by 2000%.

The study of variation has been under criticism due to its inability to control for all possible explanatory factors (i. e. health status, insurance coverage, patient characteristics, physician characteristics, etc.). In addition, variations in the provision of care controlling for patient characteristic doesn't mean doctors are controlling demand since many times there is no appropriate

benchmark of care. Therefore, if utilization rates are normally distributed, the distribution from highest to lowest rates has been measured to differ on average by 2. 3 standard deviations [20]. All that can be actually concluded from these studies is that medical decision making involves extensive uncertainty.

Other Evidences

One of the more recent examples of where demand inducement might become a problem is in the practice of defensive medicine. In recent years, due to the fear of malpractice suits, this new phenomenon is seen in doctor practice patterns. Defensive medicine can involve demand inducement as doctors can order increased diagnostic tests, more follow-up visits, and more referrals to specialists. The problem with defensive medicine is that same as demand inducement – increased expenditure. Kessler and McClellan finds in the Medicare population that reforms that decrease fear of malpractice suits can decrease expenditures by 5 to 9% [21].

Other evidence of demand inducement is the higher rates of services when physicians have financial interests in diagnostic lab or therapy facilities. Hillman et al found that radiologists who use imaging technology in their own office ordered examinations 4. 0 to 4. 5 times more than radiologists who did not [22]. On the other hand, doctors can be motivated to prescribe more due to increased access and convenience.

More weaknesses of data and methodology

Directly measuring SID is difficult. Most of the studies measure marginal or indirect SID. With this comes multiple assumptions such as increase in physician supply is not a normal market response to increase in demand; increase in doctor supply decreases income and provides the incentive for demand inducement; and it is only the inducement by doctors and not other factors that causes the increase in utilization [6]. Large disagreements also exist in the literature because the boundary between responses of the normal competitive market and with the market that allows SID is not clear. All the results that describe the possibility of SID all have alternative explanations consistent with normal competitive market.

Most studies focus on changes in care utilization and cost rather than the possible negative or positive effect of SID on patient health outcome. Supply increase due to price decrease (which in turn may reduce the doctors' income) can be explained by consumers response to the price reduction – increase demand. Then induced and non-induced demand are indistinguishable. In addition, in these studies, the value that doctors put on leisure-time is also constantly ignored. It is possible that the supply curve for doctors bend backwards (Figure 3-Appendix). In such a scenario, doctors earn an income that maximizes utility (point A of Figure 3-Appendix). When price increases they will lower the quantity supplied and increase their leisure time, which can lead to under utilization. When price decreases and their incomes falls, they will increase their service provision back to the preferred level. Again, this is indistinguishable from SID.

The cross-sectional nature of most data to test SID also presents multiple problems. First there is a lack of causality from the results. Secondly, omitted

variable bias is always present as regional differences cannot always be controlled. Moreover, the physician's choice of location is highly affected by the doctor-population ratio variable. This creates another endogeneity problem as doctors are more likely to be attracted to areas of high demand for healthcare. This is not related to demand inducement. Therefore it is hard to distinguish from the effect of SID and the effect of demand of consumers. Dranove and Wehner found that obstetricians and gynecologists could induce childbirths, which is erroneous, because of this endogeneity problem [23].

Much of the problems with measuring SID are due to the lack of good quality data. Most data are not collected for the purpose to test SID. Rather, they are collected by health departments or insurers and aggregated together for the statistical analysis. Survey data can increase patient level and physician level information, but they are expensive, and the results have been mixed. One of the biggest issues with the data is that there is no variable to measure the amount of clinical uncertainty. Therefore, some omitted variable bias will always exits.

Purposed research question

Can we test for SID and its health consequences without taking into account patient-physician ratio and geographical variations?

Purposed method and hypothesis

One possible alternative approach to test SID and its resultant health consequences is to observe patient-physician dyads over a long period of time. Following the same dyads over time can eliminate some of the omitted

variable bias such as those pertaining to geography. In addition, observing the dyad over time will not need to account for patient-physician as the same dyads are followed from the beginning until the end. Each dyad can be randomly selected into two groups. One group faces reimbursement changes to physicians and one will not. Both groups will face the same amount of cost-sharing. Controlling for physician characteristics and patient characteristics, it is possible to see if physicians change their utilization and prescription patterns for the same patient over time as a result of fee change.

For simplicity, diagnostic tests with evidence-based guidelines can be tracked in order to decrease uncertainty faced by tests that have no proven effectiveness. Current guidelines from the US Preventive Services Task Force recommend screening for colorectal cancer using fecal occult blood testing, sigmoidoscopy or colonoscopy in adults from the ages of 50 to 75. It is possible to observe how physicians react to financial incentives when coverage for one of these tests changes to full reimbursement or higher reimbursement with no concurrent educational purpose to increase screening. If for the same patient, a physician increases screening after reimbursement change and the patient's health status has not changed, then it is likely that the physician is reacting to financial incentive. Furthermore, if doctors respond to financial incentives, it is possible to aggregate the data to examine the health outcomes of the increase in utilization. One of the problems that can arise is compliance and loss to follow up. They will determine how large the population size of the study will

be. If there is low compliance and high loss-to-follow up, then the population size will be very small.

Conclusion

The biggest problem with measuring SID is that there is no direct test to measure this phenomenon. Past studies have found conflicting results. Even when studies find a possibility of SID, normal competitive market responses can be used to explain the results. There are no robust tests to test the magnitude of SID, if it exists. However, understanding the motivations of physicians to take advantage of the asymmetric knowledge in the patient-physician dyad can provide a deeper understanding of the clinical decision-making process. If SID exists, there can be wasted expenditure and inappropriate care. If SID results in negative health outcomes, then supply-side restrictions will need to be enacted to ensure patient's well-being in the patient-physician relationship.

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