Hospital-level policy can affect physician behavior and reduce C-section rates

By Sofia Amaral-Garcia, Paola Bertoli, Jana Friedrichsen, and Veronica Grembi

The past few decades have seen a considerable increase in caesarean section rates, which have now reached unprecedented levels. Concerns have been raised about the possibility of medically unnecessary procedures having negative consequences for mothers and infants (WHO, 2015). The aim of this report is to show that a properly implemented hospital-level policy may be a powerful tool for reducing the rates of unnecessary C-sections without inflicting harm on mothers or newborns. Reducing the rates of unnecessary procedures helps lower the excessive healthcare costs that present a major concern for public policy.

This report analyzes the implications of a 2005 reform introduced in the Italian region of Piedmont that increased malpractice pressure and reduced C-section rates. Empirical evidence indicates that this reform led to a 2.3 percentage point (approximately seven percent at the mean of C-sections) reduction in the use of C-sections in treated hospitals. This suggests that physicians will also alter their behavior in response to hospital-level policies—even though such policies do not directly influence individual insurance liability.

Presuming that C-section rates in Germany are partially influenced by economic and legal incentives, the Italian findings imply that increased malpractice pressure may also reduce the C-section rates in Germany, which currently exceed 30 percent—a share that is ten points higher than it was in the early 2000s. Should Germany implement a similar reform to the one introduced in Piedmont, one might expect positive effects in terms of reducing healthcare costs without affecting healthcare outcomes. This expectation presumes that there are a sufficient number of practitioners who can competently assist in a natural delivery.

Over the past few decades, C-section rates have been increasing in many developed countries and have now reached unprecedented levels (Figure 1). Several governments around the world have raised concerns about the high numbers of C-section births[1]—and since this increase has not been accompanied by significant changes in mothers' medical risk profiles, it is unlikely that all of these procedures are medically necessary.[2] Although it is difficult to compute an optimal C-section rate, we can use the example set by the U.S.'s Healthy People 2020 program,[3] which aims to decrease the C-section rate among low-risk mothers to 23 percent.

C-sections are one of the most common surgical procedures performed worldwide, but they are not always advisable. When they are conducted in the absence of medical indications, they may impose unnecessary risks on mothers and infants; they are also more expensive than natural deliveries. Fear of litigation is often seen as the driver behind the overuse of C-sections, since the failure to perform a timely C-section is one of the most common allegations in malpractice claims against obstetricians.[4] C-sections can serve as a form of defensive medicine,[5] and for decades the conventional wisdom

1 World Health Organization: WHO Statement on Caesarean Section Rates (2015).

2 World Health Report: "The Global Numbers and Costs of Additionally Needed and Unnecessary Caesarean Sections Performed per Year: Overuse as a Barrier to Universal Coverage," Background Paper 30 (2010). The present report is based on Amaral-Garcia, S., Bertoli, P., and Grembi, V. "Does Experience Rating Improve Obstetric Practices? Evidence from Italy," *Health Economics*, 24(9) (2015): 1050–1064, and CEIS Tor Vergata Research Paper Series 13 (4), N. 342 for the Italian case.

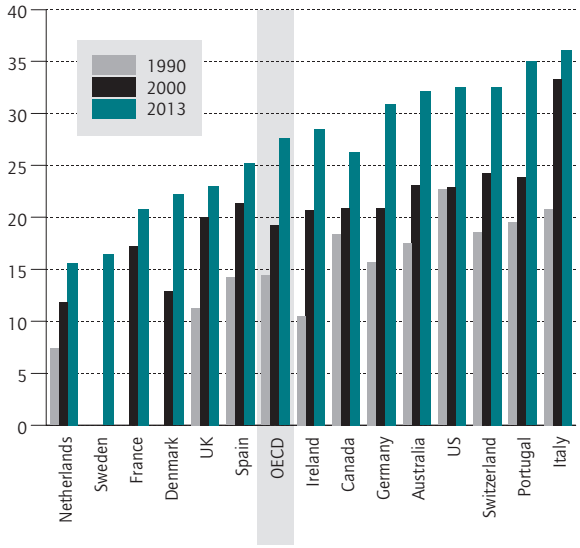
3 Healthy People 2020 is a nationwide health promotion and set of disease-prevention goals created by the United States Department of Health and Human Services. For more information, see https://www.healthypeople.gov/2020/topics-objectives (accessed October 20, 2016).

4 See, for instance, Sachs B.: "Is the rising rate of cesarean sections a result of more defensive medicine?" in Rostow VP, Bulger RJ (eds.) *Medical Professional Liability and the Delivery of Obstetrical Care: An Interdisciplinary Review*. Volume II, 2740 (1989), National Academy Press, Washington, D.C: 27–40.

5 "Defensive medicine behavior" can be described as physicians producing a supra-optimal level of care due to fear of liability, with no medical benefits for patients.

Figure 1

Caesarean sections per 100 live births, 1990–2013 (or nearest year)



Source: Our composition using OECD Health at a Glance 2011/2015.

C-section rates have been increasing in several developed countries over the past few decades, and have now reached unprecedented levels.

has been that physicians perform them more frequently whenever malpractice pressure increases.[6]

Can higher malpractice pressure lead to better healthcare?

Using data from the U.S., Currie and MacLeod (2008)[7] challenge this conventional wisdom. In their study, the authors specify two basic factors that must be taken into account when considering childbirth cases: the mother's current health and the probability of error on the part of the physician.

When choosing which delivery method to perform, a physician will start by checking the mother for possible risk factors (e.g. eclampsia, anemia, a breech baby). In many cases, this examination alone determines the delivery method: high-risk mothers will likely have a C-section, whereas mothers with no risk factors will be apt for a natural delivery. The situation is more complicated, however, for mothers who do exhibit some risk factors but are technically not high-risk—and thus are still eligible for a natural delivery.

Physicians might also consider the probability of committing an error that can potentially result in a medical malpractice case. Failure to perform a timely C-section is not the only action for which obstetricians can be held liable: they can also be liable when they should have performed a vaginal delivery but opted for a C-section instead.

Currie and MacLeod (2008) show that the likelihood of a malpractice claim being filed depends on how much the chosen delivery method deviates from the medically appropriate procedure based on the mother's condition. When there are too few C-sections being performed, the probability of an error leading to liability is greater when the physician opts for a natural delivery; the reverse is true when C-sections are being overperformed. Hence the ultimate effect of an increase in malpractice pressure on the decision to perform a C-section cannot be uniquely determined *ex ante* on theoretical grounds; rather, it depends on the level of procedure use.[8]

How certain incentives affect physicians' behavior is of key importance to policymakers and healthcare regulators, since policy reforms can induce practitioners to provide optimal levels of care—which includes reducing C-section rates to a more appropriate level. Empirical evidence on the effects of reforms on childbirth is mixed, and these studies tend to focus on the U.S. case. Evidence from European countries is virtually non-existent, with one possible explanation being a lack of data at the individual level.

Fortunately, such data are accessible in some cases. This report analyzes childbirth patterns in the Italian region of Piedmont, where a 2005 policy reform increased malpractice pressure. To analyze the effects of this policy at the individual level (by mother), we use data from the National Hospital Discharge Records on 265,532 deliveries that took place between 2002 and 2009. For the analysis of neonatal outcomes—which is only possible at the hospital level—we use data on natality certificates[9] for the same time period. We then consider the current situation in Germany in light of the Italian findings.

6 "Malpractice pressure" is a combination of the probability of being sued and of all the material and immaterial costs of litigation. It encompasses not only the fear of litigation, but also the high liability insurance premiums and the unpredictability of victims' compensation.

7 Currie, J. and MacLeod, W. B.: "First do no harm? Tort reform and birth outcomes." *Quarterly Journal of Economics* 123 (2008): 795–830.

8 See also Frakes, M.: "The surprising relevance of medical malpractice law," *University of Chicago Law Review* 82(1) (2015): 317–391.

9 Certificato di Assistenza al Parto (CeDAP).

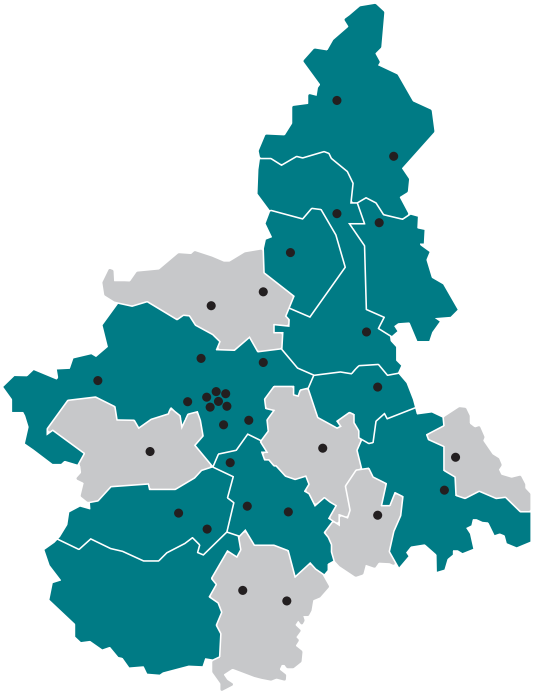
Piedmont: hospitals in court districts without damage schedules are exposed to higher malpractice pressure

Although the Italian National Health Service provides universal care, regional governments regulate local healthcare services and thus play an important role. Hospitals are responsible for providing liability insurance to their medical personnel.

In 2005, Piedmont introduced an experience-rated liability insurance requirement in all of its public hospitals.[10] According to this policy change, insurance liability premium amounts were determined by the hospital's claims history, which made hospitals more accountable and thus more concerned with motivating their physicians to reduce unnecessary risk exposure.[11] Experience rating—both at the hospital level, as in Piedmont, and at the physician level—remains an exception in medical liability insurance. Obtaining a stable risk estimate is difficult, partly due to the fact that individual physicians' claims experiences have a high variability over short periods of time.[12] Experience rating at the physician level can lead to major problems when prior claims experience alone determines the premium.[13] For instance, although differences in risk characteristics vary among patient groups and branches of medicine, and thus from physician to physician, these differences would not be reflected in the individual premiums. Experience-rated insurance at the individual level could incentivize hospitals and physicians to select certain patients in order to avoid high-risk cases—a practice known as "cream skimming" (and a form of negative defensive medicine). Each individual physician's annual volume of patients should also be taken into account. Furthermore, and considering that awards in medical malpractice cases tend to be highly skewed,[14] there are reasons to believe that the size of the claims also plays a role. Sloan (1990)[15] argues that experience rating at the physician level is not a logical choice for medical malpractice insurance, and appears to favor experience rating at the hospital level due to the higher levels of internal quality control: "Virtually every hospital's medical staff engages in some peer review to determine medical staff membership and to provide some oversight of quality of care performed at the hospital."[16]

Figure 2

Distribution of hospitals among court districts that do and do not apply schedules (2000–2009)



Court district borders in white. Grey areas identify court districts that do not apply schedules for non-economic damages. Green areas identify court districts that apply schedules for non-economic damages. Black dots represent the hospitals located in Piedmont.

Source: Amaral-Garcia, S., Bertoli, P. and Grembi, V. (2015).

Hospitals located in court districts without schedules are exposed to higher malpractice pressure than those located in court districts with schedules.

Piedmont has a regional malpractice liability fund for all public hospitals. Each individual hospital's contribution is calculated based on two factors and broken down thusly: gross payroll (30 percent) and average risk exposure from the previous three years (70 percent)—that is, the number of claims received and total damages paid. But the type of malpractice pressure a hospital faces also

10 In 2010, more than 95 percent of infants born in Piedmont were delivered in public hospitals): "Certificato di assistenza al parto (CeDAP), Analisi dell'evento nascita–Anno 2010." Ministero della Salute (2013).

11 There was no change in the liability system, and thus the probability of bringing suits against health care practitioners was unaffected.

12 Mello, M.M.: "Understanding medical malpractice insurance: a primer." *Research Synthesis Report* n. 8. (2006), The Robert Wood Johnson Foundation, Princeton, NJ.

13 Ellis, R.P., Gallup, C.L., and McGuire, T.G.: "Should medical professional liability insurance be experience rated?" *Journal of Risk and Insurance* 57(1) (1990): 66–78.

14 See for instance Danzon, P. and Lillard, L., "Settlement out of Court: The Disposition of Medical Malpractice Claims" *Journal of Legal Studies,* 12(2) (1983): 345–377. The distribution of the total paid damages tends to be highly skewed as there is a high number of cases that receive low payouts, and a reduced number of cases that account for a significant proportion of the total payout. These last cases are those with high injury severity levels.

15 Sloan, F.A., "Experience rating: does it make sense for medical malpractice insurance?" *American Economic Review* 80(2) (1990): 128–133.

16 Ibid.

Table 1

Means and standard deviations of key variables

	All deliveries	Treated	Control
Outcomes			
C-section	0.330 (−0.47)	0.336 (−0.472)	0.329 (−0.47)
Complications	0.172 (−0.378)	0.129 (−0.336)	0.179 (−0.384)
Apgar<7	0.039 (−0.034)	0.026 (−0.015)	0.041 (−0.035)
Resuscitation	0.036 (−0.028)	0.023 (−0.012)	0.039 (−0.029)
Controls at the mother level			
Risk Factors	0.183 (−0.387)	0.172 (−0.377)	0.185 (−0.388)
Age (years)	31.5 (−5.077)	31 (−5.197)	31.5 (−5.053)
Nationality	0.837 (−0.369)	0.824 (−0.381)	0.839 (−0.367)
Marital Status	0.669 (−0.47)	0.667 (−0.471)	0.67 (−0.47)

Note: Standard deviation in parentheses. Apgar<7 and resuscitation are only available at the hospital level.

Source: Amaral-Garcia, S., Bertoli, P. and Grembi, V. (2015).

Roughly 17 percent of mothers have experienced delivery-related complications.

depends on the court district in which it is located, a situation that can be exploited to identify the effects of malpractice pressure.

Hospitals are exogenously distributed across court districts (i.e. we can exclude the hypothesis that hospitals with more medical malpractice cases have decided to relocate to more "lenient" court districts) and the hospital's location determines the competent court in case of litigation (i.e. parties cannot choose in which court to file their case). Piedmont is divided into court districts that do apply schedules and those that do not apply schedules[17] when computing damages. Applying schedules limits the maximum recoverable compensation and thus leads to awards that are more predictable and less varied. Hospitals in court districts that do *not* apply schedules thus face higher malpractice pressure than those in court districts that do.[18] Our empirical strategy identifies the effect of the increase in malpractice pressure induced by the 2005 policy by examining the difference in outcomes between the treatment group (hospitals in court districts without damage schedules) and the control group (hospitals in court districts with damage schedules) (Figure 2).

Experienced-rated liability premiums lower C-sections ...

On average, 33 percent of mothers in Piedmont had a C-section (Table 1)—and given that the significant risk factors justifying a C-section were reported in only 18 percent of the cases, this share appears to be rather high (Table 1).

The econometric analysis shows that the increase in malpractice pressure reduces C-section rates by 2.3 percentage points (Table 2, column 1). This corresponds to a reduction of approximately seven percent at the sample mean of C-section (which is 33 percent as shown in Table 1) in the average C-section throughout the given period.

... and have no impact on the health outcomes of mothers or newborns

Ideally, increased malpractice pressure should reduce unnecessary C-sections without negatively impacting patients' health. Yet improperly performed natural deliveries also come with several risks, including obstetric trauma for mothers and severe and/or permanent consequences for newborns, including brain damage.[19] Therefore, in reducing the number of C-sections, the increased malpractice pressure could also lead to a higher incidence of negative health outcomes associated with vaginal delivery.

We focus here on three patient health outcomes: *complications* (a proxy for adverse events in mothers) as well as *Apgar score* and *resuscitation* (two proxies for adverse events in newborns). *Complications* encompasses delivery or post-delivery problems such as maternal fever or hysterectomy. *Apgar scores*[20] are used to determine the

17 "Damage schedules" are tables that record the severity of the injury and the victim's age, as well as the corresponding amount in euros to be attributed in the case of damages.

18 Differences between hospitals located in the two kinds of court districts are relevant in order to identify the effects of malpractice pressure. In a typical difference-in-difference strategy, the treatment group is affected by the 2005 policy reform whereas the control group is not. In our case, the policy reform was implemented in the entire Piedmont region, and thus the interaction between the introduction of experience rating and the fact that only some courts apply schedules naturally produced treatment and control groups.

19 Jensen, V.M., and Wust, M., "Can Caesarean section improve child and maternal health? The case of breech babies." *Journal of Health Economics* 39 (2015): 289–302.

20 The Apgar score measures a newborn's health status according to five criteria: Appearance, Pulse, Grimace, Activity, and Respiration. Each criterion is graded on a scale from zero to two. The scores of all criteria are then added, with a resulting score that varies from zero to ten. A score of seven and higher

health of a newborn directly after birth; a grade below seven (in the five-minute test) indicates critical neonatal conditions, as does the need for *resuscitation*. With respect to resuscitation measures, we look at whether the newborn received any major (e.g. ventilation) or minor (e.g. aspiration) treatments. Individual-level data are only available for mothers, while hospital-level data include both mothers and newborns.

Approximately 17 percent of all mothers reported complications associated with delivery (Table 1). Four out of every 100 newborns received an Apgar score below seven in the five-minute test. Similarly, approximately four out of every 100 required resuscitation.

The econometric results show that mothers and newborns' healthcare outcomes have not been affected by the increase in malpractice pressure (Table 2): the coefficients for complications, Apgar score, and resuscitation are not statistically significant.[21]

Table 2

Estimated effects of C-sections, complications and neonatal outcomes

	Patient Level				Hospital Level	
	Mothers outcomes		Mothers outcomes		Babies outcomes	
	C-sections	Complications	C-sections (r)	Complications (r)	Apgar < 7 (r)	Resuscitations (r)
Treated * Post2005	−0.023**	−0.041	−0.030**	−0.029	−0.008	−0.003
	(0.010)	(0.033)	(0.013)	(0.024)	(0.013)	(0.005)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	265,532	265,532	1,054	1,054	1,054	1,023

Controls include mothers' characteristics such as mother risk factors, age, nationality and marital status; and municipalities' characteristics such as income, education, urbanization levels, and sea level.
r: the measure is a ratio out of the total number of deliveries per period.

All regressions include both quarters and hospitals fixed effects; robust standard errors.
*Significance at the 10 % level is represented by *, at the 5 % level by **, and at the 1 % level by ***.*

Source: Amaral-Garcia, S., Bertoli, P. and Grembi, V. (2015).

After the reform in Piedmont, the number of C-sections decreased—with no negative consequences for mothers or newborns.

C-section rates in Germany since the 2000s: a 10 percentage point increase puts the current figure at over 30 percent

In Germany, individual health insurance is compulsory and must be contracted with a provider in either the Statutory Health Insurance (*Gesetzliche Krankenversicherung,* GKV) or the Private Health Insurance (*Private Krankenversicherung,* PKV). Both private and statutory health insurance cover the costs associated with delivery. According to a recent study, whether the patient is publicly or privately insured has no effect on the probability of having a C-section.[22] Therefore, we do not discuss how the two types of insurance differ from each other.

More than 95 percent of all births in Germany take place in hospitals.[23] As in Italy, hospitals in Germany are responsible for providing liability insurance to their medical personnel. In addition, some hospitals allow for births assisted by attending doctors *(Belegärzte)* or midwives *(Beleghebammen)* who are self-employed and thus must cover their own liability insurance.

Germany's C-section rate currently exceeds 30 percent, a share that is ten points higher than it was in the early 2000s and nearly double that of the early 1990s.[24] Despite the general upward trend, C-section rates vary considerably at the regional level: according to data from 2010, these rates ranged from 17 percent to 51 percent.[25] Regions with very high rates are predominantly located in Rhineland-Palatine, Bavaria, and Lower Saxony, while lower rates are primarily found in the former East. These patterns are relatively stable over time.[26] Because such discrepancies cannot be attributed to regional differences in mothers' risk profiles, they appear to be influenced by differing medical practices.[27] Data from German insurance company BARMER GEK—as analyzed in a report by the Bertelsmann Foundation—indicate

generally indicates a normal condition, whereas scores below seven indicate a critical situation.

21 See Amaral-Garcia, S., Bertoli, P., and Grembi, V. (2015) for further robustness checks.

22 Kolip, P., Nolting, H.-D., and Zich, K., "Faktencheck Gesundheit, Kaiserschnittgeburten – Entwicklung und regionale Verteilung". Study commissioned by the Bertelsmann Foundation (2012). If anything, the rate of C-sections is lower among mothers in the private health care system.

23 According to data from the Federal Statistical Office (2016), 714,927 children were born in Germany in 2014, of which 692,096 were delivered in hospitals. A hospital delivery does not necessarily imply that a physician took part: physicians are legally obligated to call a midwife for the delivery, but the physicians themselves do need not be present. See the *Hebammengesetz* as of June 4, 1985 (BGBl. I p.902), changed by Article 18 of the law from April 18, 2016 (BGBl. I p.886).

24 Kolip, P., Nolting, H.-D., and Zich, K. (2012). This development has not been accompanied by further reductions in Germany's perinatal mortality or maternal mortality, which have been relatively flat for the past 25 years. See Bundesinstitut für Bevölkerungsforschung (2016): Perinatalsterblichkeit in Deutschland nach Geschlecht, 1990 bis 2014, and Müttersterblichkeit in Deutschland, 1892 bis 2014. http://www.bib-demografie.de/DE/ZahlenundFakten/08/Abbildungen/abbildungen_node.html (accessed on September 15, 2016).

25 Kolip, P., Nolting, H.-D., and Zich, K. (2012).

26 Grote-Westrick, M., Zich, K., et al., "Faktencheck Gesundheit. Regionale Unterschiede in der Gesundheitsversorgung im Zeitvergleich." Study commissioned by the Bertelsmann Foundation (2015).

27 Kolip, P., Nolting, H.-D., and Zich, K. (2012).

that the uneven regional C-section rates are largely the result of heterogeneous decisions regarding which indications justify the procedure.[28] Moreover, a self-reinforcing effect stabilizes the observed differences, since mothers who underwent a C-section for their first child are more likely to have another for subsequent deliveries (a procedure known as a *re-section*).[29]

The same study finds that maternity clinics run (exclusively) by attending physicians have significantly higher C-section rates than those run by hospital-employed physicians[30]—and an important difference between these two groups of workers is how they are insured and paid. This suggests that C-section rates are partially influenced by economic and legal incentives.

There are further incentives for hospitals to choose C-sections. When hospitals are understaffed with midwives—as is often the case in German maternity clinics—it can be difficult to ensure high-quality natural deliveries.[31] In this case, C-sections are easier to plan and generally less time-consuming. Because each mother in an understaffed clinic is receiving less individual support, C-section rates are likely to be higher.[32] This is indeed the case: in Germany, the average midwife attends to more than 64 births per year in a hospital on average, and the C-section rate exceeds 30 percent; in Sweden, the average midwife handles 14 hospital births per year, and the C-section rate—at just 17 percent—is much lower.[33] Moreover, German hospitals are paid fixed rates per delivery based on method instead of duration, and the fixed rate is higher for a C-section than for a natural delivery. This also makes C-sections relatively more attractive than a less predictable natural birth. C-sections may thus make better use of a clinic's limited capacity while improving its profitability.

Currently, many midwives in Germany are quitting their jobs and an increasing number of smaller maternity clinics are closing down—two trends that are counterproductive in light of the above information because ensuring individual support during birth may be more difficult in larger clinics that are handling many deliveries at the same time. This development is driven by rising liability insurance premiums, which have increased in response to the fact that medical malpractice claims are resulting in substantially higher damages being awarded per case (though the actual number of cases has remained constant).[34] Such an increase may increase litigation fear among physicians and thus lead to more C-sections being used as a defensive practice, because the common perception is that physicians only risk damage charges when they fail to conduct a C-section, and not when they have employed it unnecessarily.[35]

Currently, a group of experts[36] is developing evidence-based guidelines to help doctors in Germany determine the necessity of a C-section and hopefully improve neonatal and maternal outcomes.[37] Doctors can then use these guidelines to justify their birth method decisions.

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28 A study based on data from the German Socioeconomic Panel (SOEP) shows that not only medical indications but also the socioeconomic background of a pregnant woman influence the probability that she will get a C-section. See Kottwitz, A., Spieß, C. K., and Wagner, G. G., "Die Geburt im Kontext der Zeit kurz davor und danach – Eine repräsentative empirische Beschreibung der Situation in Deutschland auf der Basis des Sozio-oekonomischen Panels (SOEP)", in: Villa, P.-I., Moebius, S., and Thiessen, B. (eds.) (2011): *Soziologie der Geburt,* Campus Verlag, Frankfurt/New York: 129–153. Another study using SOEP data suggests that access to healthcare is an important determinant of such inequalities. If the closest hospital is located relatively far, less educated women are more likely to get a C-section than better educated women; see Kottwitz, A., "Mode of birth and social inequalities in health: The effect of maternal education and access to hospital care on cesarean delivery," *Health & Place* 27 (2014), 9–21.

29 Kolip, P., Nolting, H.-D., and Zich, K. (2012). The cited study reports that one-third of the variation in regional C-section rates can be explained by the prevalence of re-sections and differences in how a subsequent delivery is performed after the mother has already had a C-section. In contrast, the DGGG's most recent guidelines—which are currently being revised—suggest that a vaginal birth is possible and favorable in most cases. See Deutsche Gesellschaft für Gynäkoöogie und Geburtshilfe e. V. (2010): Schwangerenbetreuung und Geburtseinleitung bei Zustand nach Kaiserschnitt. http://www.dggg.de/leitlinienstellungnahmen/archivierte-leitlinien/federfuehrende-leitlinien-der-dggg/?eID=dam_frontend_push&docID=2021 (accessed on September 15, 2016).

30 Kolip, P., Nolting, H.-D., and Zich, K. (2012). This study argues that the prevalence of attending physicians in a region explains 14 percent of the variation in primary C-sections in Germany. As attending physicians are rare and their numbers are dwindling, this is unlikely to explain the observed increase in average C-section rates.

31 Germany Midwifery Association *(Deutscher Hebammenverband,* DHV), "Eckpunkte für eine gute Geburtshilfe in Kliniken" (2016). www.bhlv.de/medien/dhv-eckpunkte-final.pdf (accessed on September 15, 2016). Germany Midwifery Association, Press release: "Arbeitsbedingungen in deutschen Kreißsälen gefährden Qualität bei Betreuung von Geburten" (2016). https://www.hebammenverband.de/aktuell/nachricht-detail/datum/2016/02/01/artikel/arbeitsbedingungen-in-deutschen-kreisssaelen-gefaehrden-qualitaet-bei-betreuung-von-geburten/ (accessed on September 15, 2016).

32 McGrath, S. K. and Kennell, H., "A Randomized Controlled Trial of Continuous Labor Support for Middle-Class Couples: Effect on Cesarean Delivery Rates", *Birth* 35(2) (2008): 92–97, and Hodnett, E., Gates S., et al., "Continuous support for women during childbirth", *Cochrane Database of Systematic Reviews*, Issue 7. (2013) Art. No.: CD003766.

33 "Gebärende haben keine Lobby", *die tageszeitung* (2016). http://taz.de/Debatte-Geburt-und-Familie/!5312563/ (accessed on September 15, 2016).

34 Hibbeler, B., „Haftpflichtprämien: Geburtshilfe in Gefah*r", Deutsches Ärzteblatt*, 111(12) (2014).

35 Hartmann, K., Klagen nach vermeidbarer Sectio. *Deutsche Hebammenzeitschrift* (8) 2015: 30–33. "The probability to be sued possibly depends on the income and education level of the mother, thereby creating inequalities in the provision of medical treatment across socioeconomic classes," see Kottwitz, A., Spieß, C. K., and Wagner, G. G. (2011), a. a. O.

36 The leading body is the German Society for Gynaecology and Obstetrics, DGGG. Professional associations for midwives, gynaecologists, and pediatricians are also involved.

37 AWMF online, "Angemeldetes Leitlinienvorhaben Registernummer 015–084, Die Sectio caesarea" (2016). http://www.awmf.org/leitlinien/detail/anmeldung/1/ll/015-084.html (accessed on September 15, 2016).

If the guidelines specify that C-sections are often performed without clear medical indications, it could also help lower the number of C-sections conducted purely for defensive purposes. Considering that an unnecessary procedure may have adverse consequences for mothers and newborns,[38] such guidelines can protect physicians deciding in favor of a natural delivery and discourage them from choosing to perform medically unnecessary C-sections.

Conclusion

When properly implemented, hospital-level policy may be a powerful tool for reducing excessive healthcare costs—a major concern in public policy—as well as the overuse of certain procedures, such as medically unnecessary C-sections. Empirical evidence indicates that the increased medical malpractice pressure resulting from Piedmont's 2005 reform led to a 2.3 percentage point reduction in C-section rates (approximately seven percent in the average incidence of C-sections), which suggests that physicians will alter their behavior in response to hospital-level policies—even though such policies do not directly influence individual insurance liability. Hospital-level policies have other advantages: they are easier to implement than physician-level policies and less likely to incentivize cream skimming than are individual policies based on experience rating, for instance. Importantly, Piedmont's policy did not have a negative effect on mothers or newborns: in the empirical analysis, the coefficients for complications, Apgar score, and resuscitation are not statistically significant.

C-section rates in Germany are also partially influenced by economic and legal incentives: a large part of the significant regional differences in the country's C-section rates can be attributed to cases where physicians' discretionary decisions regarding mothers whose situation is not clear-cut with regard to a C-section lead to differential treatment. Differences in how these physicians are employed and paid also play a role. When it comes to legal incentives, the fact that German maternity clinics are often understaffed in terms of midwives means that C-sections may be preferable, since they are easier to plan and more time-efficient than the average natural delivery—and given the understaffing, they may actually be safer, and thus less likely to result in a malpractice suit. Overall, if the Italian findings are externally valid, then increased malpractice pressure may also reduce the excessive C-section rate in Germany.

38 Karlström, A., Lindgren, H., and Hildingsson, I., "Maternal and infant outcome after caesarean section without recorded medical indication: findings from a Swedish case–control study". *BJOG* (2013); DOI: 10.1111/1471-0528.12129, Renz-Polster, H., David, M. R., et al., "Caesarean section delivery and the risk of allergic disorders in childhood", *Clinical & Experimental Allergy*, 35 (2005): 1466–1472, and Li, H-t, Zhou, Y-b, Liu, J-m., "The impact of cesarean section on offspring overweight and obesity: a systematic review and meta-analysis." *International Journal of Obesity* 37 (2014), 893–899.

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