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ABSTRACT

Public Payment Mandates and Provider Supply*

Public insurance reimbursement policies shape the structure and reach of healthcare markets. In this study, we examine the 1980 federal Medicaid mandate requiring states to reimburse Certified Nurse-Midwives, one of the first reforms targeting non-physician providers. We find the mandate increased midwife-attended deliveries by 1.1 percentage points, an 80% rise, adding about 1,100 midwife births annually per state by 1985. We also document a geographic expansion of midwife services into unserved areas and increased hospital employment, consistent with supply-side labor market responses. Our findings demonstrate that reimbursement mandates directly alter healthcare delivery by expanding provider use and reshaping the workforce.

JEL Classification: H51, H75, I18, I11, I13

Keywords: Medicaid reimbursements, maternal health, certified nurse-midwife, public insurance, non-physician provider, health insurance

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1 Introduction

Public insurance programs, like Medicare and Medicaid, play a central role in shaping healthcare markets. Unlike competitive markets, where prices balance supply and demand, healthcare is largely financed through insurance. As a result, reimbursement rules rather than consumer prices determine how care is delivered (Clemens and Gottlieb, 2017; Clemens et al., 2021). These rules affect not only the availability and cost of services, but also the composition of the healthcare workforce and the incentives facing providers (Clemens and Gottlieb, 2017; Yurukoglu et al., 2017; Friedson and Marier, 2017). The reach of public programs extends into the private sector as well, since private insurers frequently adopt the reimbursement standards set by Medicare and Medicaid (Clemens and Gottlieb, 2017).

Because public payment policies affect both provider incentives and employer demand, they function as labor market regulations that shape occupational choice, workforce composition, and the organization of care. These dynamics are especially salient for non-physician medical providers (NPPs), whose reimbursement rules often diverge from those applied to physicians. Under Medicare, independent nurse practitioners (NPs) and physician assistants (PAs) are reimbursed at 85% of the physician rate (CMS, 2024a,b; AAPA, 2024). Certified nurse midwives (CNMs) are an exception under federal Medicare rules (ACA and Act, 2010; ACNM, 2020), however, Medicaid programs in 20 states continue to reimburse CNMs at lower rates than physicians (ACNM, 2022a). These payment differentials create financial disincentives that can restrict access to care. Providers may hesitate to treat Medicaid patients when reimbursement is low, and employers may underutilize NPPs when their services are reimbursed at lower rates than physicians.

In this paper, we examine how a major change in public reimbursement policy influenced the use of CNMs, focusing on a landmark federal mandate in 1980.¹ We study the effects of the 1980 Omnibus Budget Reconciliation Act (OBRA), the first federal law to require coverage and direct payment for CNMs under Medicaid (Cohn, 1984; Hackley, 1981; Hoffman, 1994; OTA, 1986). Prior to the reimbursement mandate, only physician services were generally eligible for Medicaid reimbursement, effectively excluding midwives from serving Medicaid patients (Hackley, 1981; Hoffman, 1994). Before this federal mandate, in the 1970s, physicians viewed the lack of federal payment policies as a major obstacle to hiring NPs, PAs, and CNMs (OTA, 1986, pg. 57). OBRA

¹While the Medicaid mandated reimbursement focused on nurse-midwives or CNMs (terms used interchangeably in this study), the birth certificates only capture "midwives" as a group before the revision in 1989. It was not until 1989 that the birth certificates began separating other midwives from CNMs/CMs. We also do not reference Certified Midwives (CMs) with CNMs because nurse-midwives were the only formal hospital-based providers during this period; the CM credential was established after the study period, in 1994 (ACNM, 2024a).

1980 marked a sweeping policy shift. The reimbursement mandate for CNM-attended births removed a key financial barrier to CNM practice, signaling federal recognition of midwifery within mainstream maternity care.

The 1980 federal mandate represented a sharp break from the status quo, moving from no guaranteed Medicaid reimbursement for CNMs to a nationwide coverage requirement. This abrupt policy change presents a valuable opportunity to study how financial incentives influence the delivery of care. Our primary analysis focuses on the states that implemented the mandate immediately in 1980, since the sudden and federally imposed shift constitutes a plausibly exogenous shock and limits confounding factors associated with later, staggered adoptions. Though when we extend the analysis to include delayed adopters, we find that midwife deliveries rise similarly under both policy definitions.

We use the Natality Detail File (or birth certificates) and a state-level event-study design to investigate whether mandated Medicaid reimbursement increased midwife deliveries. To assess the broader impacts of the reimbursement mandate, we also draw on county-level variation in midwife availability, infant and maternal mortality ([NCHS/NVSS, 1975-1985](#)), hospital expenditure data ([AHRF, 1994](#)), and Bureau of Labor Statistics (BLS) labor market data ([BLS, 1977](#)) to examine effects on maternal and infant health, hospital costs, and labor supply.

Our findings show a large and sustained increase in midwife deliveries in states that implemented the 1980 federal reimbursement mandate. After the mandate, midwife deliveries increase by 1.1 percentage points, an 80 percent increase relative to the pre-mandate mean. Mirroring the decline in midwife deliveries, after the 1980 OBRA, physician deliveries decline by 1.2 percentage points. This shift from physicians to midwives translates into an estimated 5,500 to 12,000 additional midwife-attended births each year across the 11 early-adopting states. Overall, nearly half of the growth in midwife use in these states (over 1975-1985) can be traced to this federal policy change.

We identify a clear supply-side labor market response as a key driver of the increase in midwife-attended births. The federal mandate spurred a geographic expansion of midwifery services, with deliveries spreading to counties and states that had no prior CNM presence. This pattern indicates that the policy not only shifted the distribution of deliveries across providers but also expanded the overall workforce. Consistent with this interpretation, we find that hospitals increased their hiring of OB/GYN clinical specialists relative to other nurse categories, and wages for these specialists rose, suggesting adjustments in both staffing and compensation structures.

Taken together, these findings contrast with prior work on scope-of-practice (SOP) reforms, which primarily altered the mix of deliveries without expanding CNM supply (Markowitz et al., 2017; Hoehn-Velasco et al., 2022; Beniwal et al., 2024).

We also find that the effects of the reimbursement mandate were strongest in states with less restrictive SOP laws and in states where CNMs were reimbursed at or near parity with physicians. Contemporary observers anticipated this dynamic, where independent practice combined with direct payment was expected to make it easier for CNMs to open independent practices and even compete directly with physicians for patients (OTA, 1986, pg. 11). In fact, the proportion of CNMs in independent midwifery practices increased sharply, from 2.4 percent in 1976-77 to 14 percent in 1982 (OTA, 1986, pg. 54).

Finally, we examine downstream effects on patient outcomes and hospital expenses. Across the available measures of delivery outcomes, we find little evidence of consistent improvements. For mortality outcomes, we observe a modest increase in infant mortality following the federal reform; however, this increase is offset in counties with higher midwife growth. On the expense side, we find no reductions in hospital expenditures. Instead, nurse salary spending rises modestly in counties with greater CNM growth, a pattern consistent with increases in CNM employment and wages from the BLS results (Markowitz et al., 2017; Stange, 2014; Alexander and Schnell, 2019; Buettgens et al., 2021).

Our study makes several important contributions to the literature. First, our study is among the first to examine the effects of mandated public reimbursement on the use, employment, and distribution of NPPs. Much of the existing literature has emphasized SOP laws (Kleiner and Krueger, 2013; Wing and Marier, 2014; Stange, 2014; Timmons et al., 2016; Kleiner et al., 2016; Markowitz et al., 2017; Timmons, 2017; Traczynski and Udalova, 2018; McMichael, 2018; Chen et al., 2018; Alexander and Schnell, 2019; Grecu and Spector, 2019; Anderson et al., 2020; Markowitz and Adams, 2022; Hughes et al., 2022; McMichael, 2023; Hoehn-Velasco et al., 2022; Eck, 2021), while far fewer studies have focused on reimbursement mandates.² Influential prior work demonstrates that state-level third-party mandates increase CNM use (Miller, 2006; Adams et al., 2003), although these mandates, in most cases, followed the 1980 federal Medicaid reimbursement policy. Furthermore, because private insurers often model their payment rules on public programs, Medicaid reimbursement policies likely influence practices well beyond the public sector (Clemens and Gottlieb, 2017). These

²Liberalizations have been studied for CNMs/CMs (Markowitz et al., 2017; Hoehn-Velasco et al., 2022), as well as other provider types (Barbaresco, 2015; Wherry and Miller, 2016; Sommers et al., 2016, 2017; Benjamin D. Sommers, 2017; Boucher et al., 2015; Ghosh, 2017; Alcalá et al., 2017; Mazurenko, 2018; Lee, 2018; Gruber, 2019; Mitchell et al., 2020). Studies on reimbursement rates include NPs (Barnes et al., 2017), nurse anesthetists (Chen et al., 2023), and CNMs (Beniwal et al., 2024).

factors highlight public reimbursement mandates as a distinct and influential mechanism through which financial incentives structure provider practice and access to care.

Second, our study is one of the first to identify the employment effects of reimbursement mandates for CNMs. Earlier work on third-party mandates focused on delivery and mortality outcomes (Miller, 2006), while most employment-focused studies examine SOP reforms. SOP reforms affect the number of deliveries by CNMs but not CNM supply itself (Markowitz et al., 2017; Hoehn-Velasco et al., 2022). By contrast, we find that the Medicaid mandate spurred midwife deliveries in areas without prior CNM and midwife presence, and led hospitals to hire more nurse-specialist OB-GYN providers, resulting in shifts in employment and wages.

Third, our findings contribute to broader debates on physician labor supply and the integration of non-physician providers. Early work emphasized complementarities and substitutability between physicians and other occupations (Reinhardt, 1972; Brown, 1988; Thurston and Libby, 2002), highlighting both underutilized delegation and the efficiency gains of task shifting (Nicholson and Propper, 2011; Kleiner et al., 2016). Other studies show that the benefits of physician delegation hinge on institutional features such as compensation structures (Gaynor and Pauly, 1990), moral hazard (Gaynor and Gertler, 1995; DeFelice and Bradford, 1977), and scope versus scale efficiencies (Kimbell and Lorant, 1977; Rosenman and Friesner, 2004). Our results underscore that reimbursement mandates are a powerful financial lever that accelerates the incorporation of NPPs into mainstream healthcare, shaping workforce composition and the distribution of care.

2 Background

2.1 The Role of Certified Nurse-Midwives in the U.S. Healthcare System

The U.S. healthcare system increasingly relies on NPPs, a group that includes CNMs, nurse practitioners, and physician assistants, to address several converging pressures. These include rising healthcare costs, persistent physician shortages, and growing demand for primary and preventive care, particularly in underserved communities (Williams, 1999; ACOG, 2018; Yang et al., 2018). In this paper, we focus on CNMs, registered nurses with graduate-level education in midwifery, who provide a comprehensive range of services from primary care to specialized reproductive and newborn care (Boucher et al., 2015). While 76% of full-time CNMs focus on reproductive health, nearly half also provide primary care, positioning them to mitigate gaps in the healthcare workforce (ACNM, 2015).

Evidence from the U.S. finds that for low-risk pregnancies, CNM-led care is associated with comparable or superior care to physician-led care, including lower rates of cesarean sections,³ premature births, and other interventions (Tikkanen et al., 2020; Dubay et al., 2020). Though causal evidence from outside the United States does point to safety risks (Daysal et al., 2019), especially in the context of home births (Daysal et al., 2015). Yet, within hospitals, U.S.-based midwife deliveries reduce intervention rates (Markowitz et al., 2017; Eck, 2021), thereby lowering the use of costly procedures such as epidural anesthesia, episiotomy, and labor induction (Declercq, 2012; Glantz, 2012; Eck, 2021). These reductions translate into lower costs. CNM births during our study period cost roughly \$500–\$600 less per delivery than physician-attended deliveries (Matlock, 1980; Krumlauf et al., 1988).^{4 5}

2.1.1 CNM Training and Certification

The professionalization of nurse-midwifery accelerated with the founding of the American College of Nurse-Midwives (ACNM) in 1955. ACNM established practice standards, advocated for policy inclusion, and promoted midwifery as an integral part of maternal healthcare (Radosh, 1986; Williams, 2005; Ettinger, 2006).⁶ This marked a turning point, moving midwives from informal caregivers to formally trained professionals. By the 1970s, the number of practicing midwives grew to roughly 1,000, supported by federally funded education initiatives and endorsements from national obstetric advisory bodies (Tom, 1982; Hastings-Tolsma et al., 2018; NACPM, 2024).

Educational pathways also became more formalized. In 1978, ACNM defined Certified Nurse-Midwives as registered nurses with specialized midwifery training who met certification standards (Burst, 2005). Training a CNM was also comparatively modest compared to training an obstetrician. In 1985, training a CNM through a master's program averaged \$16,800, versus \$86,100 for physician training (OTA, 1986). Today, CNMs complete graduate-level education, certification, and regular recertification, overseen by the Accreditation Commission for Midwifery Education (ACOG, 2016; ACNM, 2022b).

The benefits of this professionalization accrue broadly. Payers such as Medicaid and private insurers save on per-episode costs, hospitals and health systems gain staffing flexibility, particularly in rural areas, and patients gain greater access to af-

³Cesarean deliveries have higher costs and charges. Medicaid reimbursed cesarean deliveries at higher rates than vaginal births, on average, \$767 vs. \$554 in 1986, with some states like Indiana and California offering nearly double in 1986. These differential reimbursements may influence provider practice (Gold et al., 1987).

⁴Recent evidence confirms about \$500 in savings through shorter hospital stays, fewer procedures, and lower direct and indirect expenses (Altman et al., 2017; Eck, 2021; Farb, 2023).

⁵While charges differ between CNM- and physician-attended deliveries, Carr (2000) shows little variation across payer sources (e.g., commercial insurance, HMOs, self-pay, Medicaid), suggesting payer mix does not drive cost differentials.

⁶Earlier licensing requirements existed before 1940 (Anderson et al., 2020), but with the shift to hospital deliveries, midwife-attended births declined.

fordable maternal care. Further, because CNMs emphasize prevention and support, the midwifery model of care provides an alternative to the obstetricians' focus on managing risk through advanced medical technologies (Likis, 2010).⁷

Despite these advantages, CNMs remain underutilized in the U.S. compared to other developed nations. In 2020, midwives attended only 10% of U.S. births, compared to over 50% in the U.K. (Digital, 2016; Tikkanen et al., 2020). Barriers such as restrictive SOP laws, hospital-level regulations, and, most importantly, reimbursement policies have historically limited the financial viability of midwifery practice in the U.S. (Markowitz et al., 2017; Hoehn-Velasco et al., 2022; Beniwal et al., 2024).

2.2 Reimbursement Policies for CNMs

The evolution of CNM reimbursement policies has been instrumental in shaping CNM's role in the U.S. healthcare system. While CNMs receive mandated reimbursement today, this was not always the case. Physicians used to be the only recipients of reimbursement from insurers. Legislative changes over time have steadily expanded access to midwifery services. Crucial shifts in reimbursements for CNMs include the 1980 OBRA, state-level third-party payment mandates, and the Affordable Care Act's (ACA) change to Medicare's reimbursement policy, which increased CNM/CMs reimbursement to 100% of physicians (Hackley, 1981; Miller, 2006; CMS, 2024a,b; AAPA, 2024).⁸

2.2.1 Public Reimbursement through the 1980 OBRA

The 1980 OBRA fundamentally changed CNM care in the US by requiring Medicaid to pay CNMs directly.⁹ This federal rule meant states had to include CNM services in their Medicaid programs as long as those services were within the CNM's legal SOP.¹⁰ Before the 1980 OBRA requirement to reimburse CNMs, CNMs reimbursement faced obstacles, especially in areas with a high density of Medicaid recipients (Hackley, 1981). This lack of reimbursement limited the access of low-income individuals to midwifery care (Hackley, 1981).

The 1980 OBRA mandate occurred alongside rising medical costs and the unequal distribution of physicians, which limited healthcare for pregnant women (Rosenblatt et al., 1997). Mandating Medicaid reimbursement for CNMs aligned with a broader

⁷CNMs collaborate with physicians and provide complementary services in obstetrics (Avery et al., 2012), though overlap in primary care can also create competition (OTA, 1986).

⁸That is, reimbursements for CNMs being on par with physicians means that the reimbursement reimburses CNMs the same amount as physicians for the same covered service (ACNM, 2021).

⁹Public Law 96-499, dated December 5, 1980.

¹⁰The statement comes from House Conference Report Number 1479: "Provision would not preempt state law or regulation relating to the legality or scope of practice of nurse-midwives." Figures A.1 and A.2 show the specific text of this act, and the House discussion.

effort to enhance access to maternal care while reducing costs.¹¹ At the time, studies indicated that CNMs could safely and affordably care for low-risk pregnancies, often at lower costs than physician-led care (Levy et al., 1971; Oakley et al., 1996). The rising medical costs, lack of services, and high-quality care provided by CNMs prompted Congress to mandate nurse-midwife services through Medicaid.¹²

Despite the federal requirement for Medicaid to reimburse CNMs, states varied considerably in when and how they implemented OBRA (Figure I, Table A.1). Some, such as Alaska, California, and Colorado, complied immediately, while others delayed implementation for up to a decade. These delays reflected a combination of administrative hurdles, budget constraints, and resistance from physician groups concerned about competition from non-physician providers (OTA, 1986; Declercq, 1992; Declercq et al., 1998; Cohn, 1984). Although physician organizations often opposed direct reimbursement, an FTC report in 1979 emphasized that non-physician practitioners typically serve as economic complements to physicians by enhancing productivity and earnings, rather than acting as substitutes (Stone et al., 1979; Bryan, 1979). Similar challenges in extending reimbursement also appeared with other non-physician providers, such as nurse practitioners in family and pediatric care (Cohn, 1984).

Since the 1980 federal mandate to reimburse CNM services, Medicaid has become a primary source of income for CNMs (Scupholme et al., 1992; Ament, 1998). For example, up to 69% of CNMs reported that Medicaid reimbursement was an important component of their income in 1991 (Scupholme et al., 1992). The same survey suggests that Medicaid accounts for over 40% of CNM income at the national level (Scupholme et al., 1992). Reliance on reimbursement also varies by the setting of CNM services, with hospital settings heavily relying on Medicaid reimbursement (Scupholme et al., 1992).

2.2.2 Issues Affecting CNM Use Under the 1980 OBRA

The 1980 OBRA mandate required Medicaid to reimburse CNMs but did not specify reimbursement rates. As a result, states varied widely in reimbursement. Surveys in the 1990s show CNMs were paid between 65% and 100% of physician rates for maternity services (Hoffman, 1994; Courtot et al., 2020). Reimbursement was also contingent on employment status. CNMs could be paid directly if self-employed or through their employers if hospital-based (Hoffman, 1994). These differences shaped both the financial viability of independent midwifery practices and the incentives of hospitals

¹¹Medicaid covered a range of maternal and newborn services, including prenatal care, delivery, newborn care, and postpartum support (Kenney et al., 1986).

¹²While the federal mandate standardized the requirement for CNM reimbursement, states retained significant discretion in setting reimbursement rates and defining the specific services covered, leading to substantial variation in implementation across states (Hoffman, 1994).

to integrate CNMs, with higher reimbursement rates signaling stronger revenue potential (Rosenzweig et al., 2017).

Labor costs reinforced these incentives. In the 1980s, CNMs earned an average salary of about \$24,800, compared with nearly \$100,000 for younger OB/GYNs and \$60,000–\$80,000 for primary-care physicians (OTA, 1986). These disparities reflect not only the SOP and risk but also training costs and malpractice expenses (Knedle-Murray et al., 1993). The result was a clear cost advantage for employing CNMs, particularly as reimbursement differentials for primary care narrowed, making them increasingly competitive. Importantly, patients had limited price information during this period, so these dynamics played out mainly through institutional staffing decisions rather than consumer choice (Knedle-Murray et al., 1993).

The broader insurance environment also mattered. Health Maintenance Organizations (HMOs) and Managed Care Organizations (MCOs), which expanded in the 1980s, typically operated under capitation and employed non-physician providers on a salaried basis. In those settings, the OBRA mandate likely had limited direct influence on CNM employment (OTA, 1986). Nonetheless, CNMs remained attractive to HMOs as cost-effective providers, even if some studies found higher prenatal and postpartum costs due to longer visits and referrals (Cherry and Foster, 1982; OTA, 1986). Overall, HMO expansion likely biased our estimates downward, strengthening the case that Medicaid reimbursement was the key driver of CNM growth.

Finally, it is important to understand who Medicaid covered during this period. In the 1970s, eligibility was tightly linked to participation in the Aid to Families with Dependent Children (AFDC) program, which primarily served poor, single mothers and their children (Moffitt, 1992; Hoynes, 1996). This link made AFDC participation the main pathway into Medicaid for women of reproductive age (Gold, 1980). Beginning in the 1980s, however, states expanded eligibility to include low-income pregnant women outside AFDC, resulting in gradual expansions in some states and sharp shifts in others (East et al., 2023).¹³

2.2.3 Third-Party Reimbursements

In addition to Medicaid reimbursement reforms, third-party reimbursement mandates for CNMs expanded significantly between 1973 and 1999. Washington became the first state to mandate CNM reimbursement in 1973, and by 1999, thirty-four states had implemented similar laws (Mullinax, 1987; Miller, 2006). Private insurance cover-

¹³ AFDC participation has been used in prior research to identify Medicaid recipients (Goodman-Bacon, 2018, 2021), and for able-bodied women of reproductive age AFDC served as the primary pathway into Medicaid (Gold, 1980). Medicaid recipients were also more likely to be Black than white; in the late 1970s, “an estimated 39 percent of black women rely on Medicaid for their health care, including abortion, compared to just seven percent of white women” (Lincoln et al., 1977, pg. 213).

age of CNM services also increased during this period. By 1982, forty-five private insurers were reimbursing for nurse-midwifery care, and in states that licensed CNMs, most commercial insurance plans provided coverage for their services (Cohn, 1984). These third-party reimbursement mandates played a crucial role in expanding access to CNMs because insurance dictates patient choice of providers. In 1975, 33 percent of healthcare costs were paid out-of-pocket, while government-funded programs covered 40 percent, and 26 percent were funded by private insurance (Congress, 1990).

2.2.4 The Primacy of Public Reimbursement Mandates

A natural question is why we emphasize the Medicaid mandate rather than state-level private reimbursement laws enacted around the same time (Miller, 2006). While both policies shaped incentives, we argue that the federal Medicaid mandate was a pivotal intervention that reshaped midwifery care in the U.S., for three reasons: the size of the Medicaid market, the nature of the policy intervention, and Medicaid's role as a market-maker.

First, Medicaid represented a large and rapidly expanding market for maternity services. Federal eligibility expansions in the mid-1980s dramatically increased its reach: Medicaid financed about 18% of U.S. births in 1985,¹⁴ rising to more than 30% by 1992, making it the largest single payer for childbirth in many states (Howell, 2001). Second, the 1980 OBRA mandate was a federal law, providing a clearer and more exogenous policy shock than the politically contingent passage of state-level private mandates. Third, public insurance policies often set precedents for private markets. Large-scale public programs can reshape the healthcare sector by influencing provider behavior and private-payer standards (Finkelstein, 2007; Clemens and Gottlieb, 2014). In this way, the Medicaid mandate helps to establish the legitimacy of CNMs, which in turn reduces payer risk and creates spillovers that affect all patients regardless of payer. Thus, public insurance mandates pave the way for broader private payer acceptance.

3 Data

3.1 Birth Certificate Records

Our primary data source is the Natality Detail Files (birth certificate records) from the National Vital Statistics System (NVSS) and the National Center for Health Statistics (NCHS) (NCHS/NVSS, 1975-1989). We use the years 1975-1985 in our main specification, though we also extend certain samples to 1987. 1975 is the first year that

¹⁴Roughly 10–11 percent of total maternity care expenditures (Kenney et al., 1986).

midwife deliveries were independently reported in the birth certificate data (in the "attendant" variable).

The data provide detailed information on the location of delivery, the mother's residence (including state and county), and the characteristics of both the mother and newborn. The advantage of the birth certificate data is its near-comprehensive coverage of U.S. births. The birth certificate records capture almost all registered births in the United States for most years, with the exception of some years in the 1970s that include only a 50% sample. In cases where the sample is a 50% sample, each observation is effectively weighted by two. These weights are provided in the data.

However, despite the benefits, the dataset has several important limitations. First, prior to 1989, the available variables were relatively limited. Key variables, including maternal education, marital status, and delivery outcomes like cesarean, were inconsistently reported or not reported (in the case of cesarean section) prior to 1989. For midwife-deliveries, the pre-1989 measure of midwife includes all midwife-attended births, rather than separating out CNM births. Thus, when we refer to "CNM deliveries" throughout the paper, we include all midwife-attended births. Although we attempt to be precise in the use of "midwife" for the variable in the birth certificates, we use the term "CNM" to refer specifically to CNMs when discussing regulations and reimbursement practices that are unique to CNMs. Because the existing literature also uses the term "CNM," we use CNM when contextualizing the results.

We suspect that using the broader grouping of midwives will result in underestimating the effect of the Medicaid reimbursement, because any switch from non-nurse midwives to CNMs will not be captured in our analysis. In 1989, the first year CNMs and non-nurse midwives are reported separately, non-nurse midwives account for a small share of midwife deliveries, only 10% (see Figure A.3). This translates to 0.37 percent of all deliveries being to non-CNM midwives, while nurse midwives account for 3.6 percent of all deliveries in 1989. For illustrations of the birth certificate forms across revisions, see Figure A.4 and Figure A.5.

A second limitation is that midwife-attended deliveries are known to be under-reported (Biscone et al., 2017; Faucett and Kennedy, 2020). While the studies demonstrating this under-reporting problem have used more recent data, we suspect that similar critiques will apply to our setting. In our consideration of midwife-attended deliveries, an increase in midwife use may represent a true increase in midwife deliveries, or it may represent reporting changes. However, we would argue that midwife deliveries being correctly ascribed to a midwife is still an important indicator of midwives' ability to practice. In cases where deliveries are assigned to physicians rather

than midwives, this signals a lack of autonomy for the midwife provider. We also rule out reporting as the sole explanatory factor for the rise in midwife deliveries in the mechanisms section.

In our primary (event study) analysis, we aggregate delivery characteristics to the state (or county) level. When we collapse the data, our primary measure of midwife use is the share of deliveries attributed to midwives. At the individual level, midwife use is a binary variable, where one indicates the use of a midwife, and zero indicates a physician or other delivery. Using the collapsed data, rather than the individual-level data, is computationally less taxing as the individual-level dataset comprises millions of observations. We show both the weighted, population-based effect and the unweighted average state-level effect in our results.

3.2 Sample Selection

Throughout the analysis, we exclude states that pass third-party payment mandates for CNMs. Third-party payment mandates pass in several states alongside (or just before) the Medicaid reimbursement mandates. We exclude states that have newly mandated third-party payments due to contamination bias from multiple related policies passing close together in time (De Chaisemartin and D’haultfœuille, 2023; Hoehn-Velasco et al., 2024). Because we have a large selection of states that did not pass third-party payment mandates for CNMs during the period, it is possible to isolate the effect of mandated public payments through Medicaid for CNMs. Altogether, our primary analysis focusing on the 1980 federal mandate includes 29 units (Figure III), and the analysis considering staggered adoption includes 32 states and DC (Figure IV.A). However, the results are similar whether or not we include these additional third-party mandate states (Figure IV.B/Figure V). We also only include deliveries when the delivery occurs in the resident state. This follows Markowitz et al. (2017) and Hoehn-Velasco et al. (2022), ensuring that the state-level reimbursement correctly corresponds to the provider environment.

3.3 Summary Statistics

Figure I Panel A presents a map showing the timing of the CNM Medicaid reimbursement mandates. The dates here come from state-level CNM policies published in the *Journal of Nurse-Midwifery*. States shaded in white did not adopt Medicaid payment mandates during the study period. States in light blue implemented the federal Medicaid reimbursement mandate in 1980, in line with the federal mandate. These light blue states, which adopted the federal reimbursement mandate in 1980, form our main treatment group for the initial analysis. Though we also consider the states

that implemented the mandate later, forming a secondary analysis based on staggered adoption of the reimbursement mandate. These darker states adopted Medicaid reimbursement mandates between 1981 and 1985. The exact dates of these mandates for each state are detailed in Table A.1.¹⁵

Figure I Panel B illustrates the geographic change in midwife use over time by state from 1975 to 1985. We also show midwife use for individual years (1975, 1980, 1985, 1990) in the appendix in Figure A.7. Almost all states experience increases in midwife deliveries, although notable exceptions exist in the South and Midwest. The clearest growth in midwifery care over the period occurs in the Northeast, the West Coast, as well as in Georgia and Florida.

Figure II plots midwife-attended deliveries from 1975–1985, marking the 1980 Medicaid reimbursement mandate with a vertical line. The comparison (gray) series shows states without the 1980 mandate; the treated (dark blue) series shows states that adopted the mandate in 1980. Before 1980, the levels and trends are similar across groups, but after 1980, the treated series rises sharply while the comparison group increases only modestly. By the end of the sample, midwife-attended deliveries in treated states have more than doubled relative to pre-period levels. These descriptive trends mirror our main event-study findings: states that pass the federal Medicaid reimbursement mandate experience a substantial increase in midwife use.

Table 1 presents the summary statistics before the adoption of the Medicaid reimbursement mandate. We show the pre-adoption years (1975-1979) to compare whether there are large differences in deliveries before the Medicaid reimbursement mandate went into effect. We present two samples: (i) states where the federal mandate was passed in 1980. And (ii) staggered adoption states that passed the Medicaid mandate in 1985 or before. Table 1 reveals that states that implemented Medicaid reimbursement mandates have similar levels of midwife deliveries in the pre-adoption period. While there are some significant differences in other outcomes, such differences are accounted for in our analysis by the inclusion of state and year fixed effects.

4 Empirical Strategy

For our main empirical strategy, we employ an event-study design to examine the effect of mandated CNM reimbursements on the provider present at the delivery. In the main results, we present both the share of deliveries to physicians and to midwives, but we view the share of deliveries to midwives as our primary outcome of interest.

¹⁵A map of third-party payment mandates is provided in Figure A.6, with dates from Miller (2006)

In the baseline analysis, we treat the 1980 federal Medicaid reimbursement mandate as the policy shock, comparing states that adopted the Medicaid reimbursement for midwives in 1980 against states that did not adopt Medicaid reimbursement until 1985 or later. For the main results, we focus first on the 1980 adopters, where the immediate onset of the federal mandate created a uniform, externally imposed shock, offering a particularly compelling setting to study reimbursement mandates. We then extend the analysis to explore the effects of the staggered adoption of the reimbursement mandate through 1985 (Figure IV.A), allowing each state's treatment to begin when it adopts Medicaid reimbursement. We also redefine treatment as the state's first reimbursement mandate of any type, whether for Medicaid or third-party coverage (Figure IV.C). This adjusted specification considers the earliest reimbursement mandate as the most important treatment.¹⁶

For our main specification focusing on the adoption of the 1980 federal reimbursement mandate, our primary event study appears as follows:

$$\text{Midwife}_{st} = \alpha + \sum_{\substack{m=1975 \\ m \neq 1979}}^{1985} \beta_m 1(\text{Federal Reimbursement Mandate})_{sm} + \mathbf{X}'_{st} \gamma + a_s + \eta_t + \epsilon_{st} \quad (1)$$

where the outcome variable Midwife_{st} is the share of deliveries to midwives in state s and year t . In the main results, we also consider the share of physician deliveries alongside midwife deliveries, Physician_{st} .

The main independent variable of interest, $1(\text{Federal Reimbursement Mandate})_{sm}$, captures the adoption of the 1980 federal Medicaid reimbursement mandate for CNMs. We consider m periods ranging from five years before the reimbursement mandate, 1975, until five years after the mandate, 1985. In our event study, the main effect of the reimbursement mandate is captured by the post-periods $m = 1980, \dots, 1985$. The period $m = 1979$ is the omitted reference period.^{17,18} Because our main presentation of the results centers on the 1980 change, we exclusively show the estimates from the canonical two-way fixed effects (TWFE) estimator because we do not have staggered adoption. However, when we consider the staggered adoption of the Medicaid mandate and the

¹⁶For the staggered adoption our main empirical strategy appears as $\text{Midwife}_{st} = \alpha + \sum_{\substack{m=-5 \\ m \neq -1}}^5 \beta_m 1(\text{Mandate})_{sm} + \mathbf{X}'_{st} \gamma + a_s + \eta_t + \epsilon_{st}$ where the majority reflects Equation 1, except the staggered adoption. In Equation 16, the main effect of the reimbursement mandate is captured by the post-periods $m = 0, 1, \dots, 5$. The period $m = -1$ is the omitted reference period. The event-study endpoints are binned at $m = 5$ and $m = -5$, but these binned endpoints are excluded from the event-study plot.

¹⁷When we consider the grouped post-period specification, we consider the years after the reimbursement mandate (e.g., $m = 1, 2, 3, \dots$), not including the adoption year, $m = 0$, this is because the reimbursement mandate was passed in December of 1980. The effect is also relative to control states, or states that did not adopt the mandate between 1980 and 1985.

¹⁸We consider deliveries by the date of birth rather than the conception date because the change in policy could have an immediate effect on the structure of care. Thus, the reimbursement mandate may instantly affect the demand for CNMs and the supply of CNMs, potentially through the hiring of new CNMs or the repositioning of existing CNMs within the healthcare system.

first reimbursement policy (Figure IV), we also show the Interaction-Weighed (IW) estimator (Sun and Abraham, 2021).¹⁹

X_{st} represents the state-level controls. Controls include the average maternal age from the birth certificates, the state-level prenatal Medicaid eligibility and Medicaid expansions reported in East et al. (2023), the log of the number of physicians per 1,000 (AHRF, 1994), and the share of reproductive-age females with both a high school and college education (Ruggles et al., 2021).²⁰

State fixed effects are represented by a_s . The year of delivery fixed effects are η_t . Throughout the results, robust standard errors are clustered at the state level. However, we present Wild-cluster bootstrapped standard errors in the robustness checks (Figure V). It is also worth noting that in the primary analysis, we use collapsed data. To collapse the data, we take the mean of delivery characteristics for each state and each year. In our main results, we do not weight by population, because the population-weighted results rely heavily on California.²¹ Although the weighted and unweighted results are similar in other respects, we present the average state-level results in our primary findings. Though if we include weights, the results are largely the same (Figure V).

In the appendix, we assess whether the timing of Medicaid reimbursement mandates is systematically related to our key outcome variable: midwife-attended deliveries. To assess whether prior trends in midwife-attended deliveries predict the timing of the reimbursement mandate, we estimate Cox proportional hazard models (Table A.2 Panel A) and OLS regressions (Table A.2 Panel B). In Table A.2 Panel A, the “failure year” is defined as the year of the reimbursement mandate, while in Panel B, the outcome is equal to one in the year of the reimbursement mandate. In both cases, we test whether the share of midwife deliveries predicts adoption of the reimbursement mandate. As shown in Table A.2, we find no statistically significant relationship between the evolution of midwife deliveries and the adoption of the reimbursement mandate. These results suggest that the timing of Medicaid reimbursement mandates was not driven by changes in prior midwife use, supporting the plausibility of our identification strategy.

¹⁹Sun and Abraham (2021)’s estimator deals with the fact that the dynamic TWFE event study estimates can be contaminated by treatment effects from other time periods, which will result in bias. The IW estimator addresses the bias in the TWFE specification and uses the never-treated group as the control group (in our case, the last treated in 1990 or onwards). The IW estimator is effectively a special case of (Callaway and Sant’Anna, 2021).

²⁰Log of physicians is linearly interpolated for missing years. The education variables are also linearly interpolated between census years. Unfortunately, the birth certificate records are missing important variables such as education and marital status for many state-year observations in our sample, limiting our ability to control for these factors. We also avoid controlling for related reimbursement policies and private third-party mandates, instead excluding these states. This is due to potential contamination bias (De Chaisemartin and D’Haultfoeuille, 2023).

²¹Similar issues with California composing a large portion of the sample weight have been documented in Hoehn-Velasco et al. (2024). When we perform a leave-one-out analysis with weights, the results are driven by California, but the unweighted results are not (see Figure B.6)

5 Results

5.1 The 1980 Federal Mandate Shifts Deliveries from Physicians to Midwives

Figure III Panel A presents event-study estimates on the 1980 federal Medicaid reimbursement mandate for certified nurse-midwives. Panel III.A.1 shows the share of midwife deliveries, and Panel III.A.2 presents the share of deliveries to physicians. Following the federal mandate, states show a clear increase in midwife-attended deliveries accompanied by a corresponding decline in physician-attended births. The transition from physician-to-midwife deliveries begins in 1981 and persists throughout the post-period.²²

Panel A of Figure III documents this decline in deliveries to physicians and growth in deliveries to midwives. The share of midwife-attended births rises by 1.1 percentage points, an 81% increase relative to the mean. This increase in midwife births is mirrored by a 1.2 percentage-point decline in the share of physician-attended deliveries (a 1.2 percent decline). These event-study point estimates indicate a clear substitution from physicians to midwives after Medicaid began reimbursing CNM services. The timing and persistence of these effects illustrate the importance of reimbursement mandates in shaping provider use.

5.1.1 Counterfactual: Midwife-attended Births Increase by 5,500-12,000 Annually

To place the point estimates in context, Panel B of Figure III traces the observed and counterfactual paths of midwife-attended deliveries.²³ Panel III.B.1 shows the average state-level effect of the mandate on the number of midwife deliveries. In 1979, both the predicted (navy blue) and counterfactual (light blue) paths align at roughly 400-800 midwife-attended births. After 1979, the counterfactual and predicted paths diverge, and by 1985, the mandate path reaches 2,268 midwife-attended births while the counterfactual plateaus at only 1,114 midwife-attended births. The difference between the predicted and counterfactual path translates into an additional 1,150 midwife births in each state in 1985 (gray). Panel III.B.2 aggregates the number of midwife births across the 11 treated states. In aggregate, the mandate produces between 5,500 and 12,000 additional midwife-attended deliveries annually over the post-period.

²²See Figure B.1 for estimates including all states, without excluding third-party mandate states.

See Figure B.2 for non-physician/non-midwife providers, or "other" providers. There are only three categories on the birth certificates. There is no change in other providers.

²³Following Freedman et al. (2025), the figure plots three series: (i) the predicted values from the event-study specification multiplied by the number of births (dark blue), (ii) a counterfactual series that removes the mandate's contribution (light blue), and (iii) the difference between the predicted number of midwife births and the counterfactual number of midwife births (gray). Predicted values are generated from the baseline event-study regression. The counterfactual subtracts, for each event time, the estimated mandate coefficients multiplied by the corresponding indicators. These estimated shares are then multiplied by the number of births to obtain the predicted and counterfactual number of midwife deliveries.

How large could the cost savings from this shift be? Evidence from [Cherry and Foster \(1982\)](#) indicates that, in the early 1980s, CNM patients had roughly \$114 lower hospital charges per delivery than physician patients (\$473.36 in 2025), mainly due to shorter hospital stays and the use of less expensive birth rooms.²⁴ Applying this estimate to our counterfactual results, the 1,150 additional CNM-attended deliveries per state in 1985 imply annual savings of approximately \$131,000 per state (about \$540,000 in 2025). Aggregated across the 11 treated states, this corresponds to total savings of \$570,000–\$1.4 million annually (\$2.4–\$5.6 million in 2025).

5.1.2 Contextualizing the Increase in Midwife-Attended Births

Taken together, these results demonstrate that the 1980 Medicaid reimbursement mandate reallocated deliveries from physicians to midwives. Midwife-attended births increased by 1.1 percentage points (an 80 percent rise), mirrored by a 1.2 percentage-point decline in physician-attended deliveries. Absent the mandate, midwife use would have remained near 1,000 deliveries annually through the mid-1980s; with the mandate, midwife deliveries doubled, adding roughly 5,500 births in 1981 and 12,000 by 1985 across the 11 states.

These findings underscore the central role of public reimbursement in shaping provider use and are consistent with prior evidence on private insurance mandates and other regulatory reforms. For example, [Miller \(2006\)](#) finds a 0.8 percentage-point increase in midwife-attended deliveries following third-party payment mandates, while expansions in full practice authority yield gains of about one percentage point ([Markowitz et al., 2017](#); [Hoehn-Velasco et al., 2022](#)). Likewise, [Beniwal et al. \(2024\)](#) shows that the ACA, through regulatory changes, raised CNM use by 1.1 percentage points. Taken together, reducing barriers to CNMs increases CNM use by about one percentage point across a wide range of policy contexts (private insurance mandates, scope-of-practice laws, and federal health policy changes).

The present paper contributes to this literature by examining the first federal reform targeting CNMs. We find larger relative effects than previous studies because midwife use was relatively uncommon during the 1970s and 1980s. This federal reimbursement policy thus contributed to the mainstream adoption of midwives in maternity care. Our results establish the historical significance of this Medicaid reimbursement mandate as one of the earliest studied national policies targeting midwives. Our

²⁴This estimate is conservative; a recent causal study, [Eck \(2021\)](#), shows a reduction in costs by 9% after full practice authority, which caused a similar percentage point shift to CNMs from physicians ([Hoehn-Velasco et al., 2022](#)). These estimates are also smaller than [Matlock \(1980\)](#), which estimated savings to be between \$500 and \$600 per delivery. These figures are potentially conservative because they only capture direct hospital charges and overlook potential downstream savings from reduced intervention rates. Moreover, because these estimates are derived from hospital charges rather than hospital cost data, lower salaries paid to CNMs or other cost differences between CNMs and physicians likely understate the broader savings of shifting deliveries toward midwives. Due to the factors, in Sections 8 and 9, we explore these birth outcomes, cost, salary, and employment dimensions of the reimbursement mandate.

results show that this national policy catalyzed substantial relative increases in the use of midwives. The federal Medicaid mandate helped integrate midwives (<1% of deliveries in 1975, Figure II) into a more established part of the maternity care system, reaching 3% of deliveries by 1985 (Figure II).

5.2 Additional Results: Staggered Adoption of the Medicaid Reimbursement Policy and the First Mandated Reimbursement

Next, Figure IV examines alternative definitions of the reimbursement mandate. Panels A and B show the staggered adoption of Medicaid reimbursement mandates, while Panel C shows the effects of the first reimbursement mandate in the state (Medicaid or third-party).

5.2.1 Staggered Adoption of the Medicaid Reimbursement Mandate

Panel IV.A considers states that adopted Medicaid reimbursement mandates between 1980 and 1985 in a staggered adoption pattern, excluding states that also implemented third-party mandates. Panel A reveals that the staggered adoption of the Medicaid reimbursement mandate led to an increase in midwife deliveries and a decline in physician deliveries, consistent with the national results. Following the Medicaid reimbursement mandate, midwife deliveries rise by 1.0 percentage point, almost equivalent to the baseline estimate of 1.1 percentage points with the initial federal mandate. This increase in midwife deliveries represents a 67 percent increase relative to the mean. The rise in midwife deliveries is mirrored by a corresponding 1.0 percentage point decline in physician-attended deliveries, a 1 percent reduction relative to the mean. Both the immediate adoption and the staggered adoption of Medicaid reimbursement shift the provider composition from physicians to midwives.

Panel IV.B broadens the analysis to include all Medicaid reimbursement mandates, regardless of whether states also enacted third-party mandates. In this specification, we explicitly control for the presence of third-party mandates to isolate the independent effect of the Medicaid reimbursement mandate. The results in Panel B display a smaller estimated increase in midwife deliveries than the baseline. Here, midwife deliveries rise by 0.8 percentage points (a 39 percent increase relative to baseline), while physician deliveries decline by roughly 0.7 percentage points. The smaller effect size compared to Panel A likely reflects the inclusion of states where private reimbursement mandates were already in place, dampening the relative contribution of the Medicaid reimbursement mandate. In the main results (Figure III and Panel IV.A), the Medicaid reimbursement is the first payment mandate in each state (except in Washington), which could result in a stronger effect when the first mandate takes ef-

fect.

5.2.2 First State-level Adoption of a Reimbursement Mandate

Panel IV.C focuses on the first reimbursement mandate enacted in each state, whether through Medicaid or a third-party insurer. This specification highlights the earliest year at which midwives could be guaranteed reimbursement. We again find similar effects to Panel B: midwife deliveries increase by 0.7 percentage points (34 percent), while physician deliveries decline by 0.7 percentage points. The similarity between Panels B and C results from the fact that most states enacted Medicaid reimbursement mandates first. Of the 10 states in our sample that implemented third-party payments first, all but three states adopted the third-party mandate only a year before the Medicaid reimbursement.²⁵ Due to the close timing of policies, in the mechanisms section, we further explore the distinct impacts of third-party versus Medicaid reimbursements (and the interaction of the two, see Table 2).

Overall, the results from both Figures III and IV show a clear decline in physician-attended deliveries with a parallel increase in midwife-attended deliveries. The transition from physicians to midwives suggests that reimbursement mandates shifted births across provider types. Regardless of how we capture the reimbursement mandate, we find a large increase in midwife use by 0.7-1.1 percentage points.

6 Robustness Checks

6.1 Sensitivity Analyses

Figure V explores alternative event-study specifications for midwife deliveries. We also show robustness for physician deliveries in Appendix Figure B.3. Across all adjustments to the baseline specification, the rise in midwife deliveries remains evident. For completeness, we also show the primary robustness checks over the staggered adoption specification in Figures B.5 and B.4.

First, Panel (1) shows results using the log of midwife deliveries rather than the linear specification. Panel (1) shows similar results to the baseline, with estimates indicating a clear increase in midwife deliveries after the payment mandate. Second, Panel (2) removes linear pre-trends by first regressing midwife deliveries on a linear time trend (with state and year fixed effects) and then using the residuals as the outcome. The resulting treatment effect is essentially unchanged, suggesting little evidence of pre-existing trends that could bias our estimates.

²⁵WA is removed because it passed the first third-party reimbursement mandate before 1975.

Third, Panels (3)–(5) introduce additional controls. Panel (3) adds the state-level income (log of income per capita, the log of the maximum ADFC payment) and the state-level share of married individuals (from [Wolfers \(2006\)](#); [East et al. \(2023\)](#)). Panel (4) includes age-by-race and birth order controls. Panel (5) includes all controls together. The results are largely unchanged, with estimates ranging from a 70 to 80 percent increase in midwife deliveries. Fourth, Panel (6) drops Medicaid expansion states for expansions that occurred before 1985. Even without these states, the magnitude of the increase in midwife deliveries is similar to the baseline.

Fifth, Panel (7) examines the effect of weighting by the number of births. Including weights and estimating the population-based effect rather than the average state-level effect produces a slightly smaller point estimate (47 percent increase). Though the overall increase in midwife deliveries remains consistent. Sixth, Panel (8) implements Wild Cluster Bootstrap standard errors ([Cameron et al., 2008](#); [Roodman et al., 2019](#); [Clarke and Tapia-Schythe, 2021](#)), which yield similar significance levels to the baseline. Sixth, Panel (9) explicitly tests for pre-trends using the framework of [Roth \(2022\)](#) using 50% power. While point estimates in the pre-period appear slightly upward sloping, the estimated treatment effect in the post-period is well above the estimated pre-trend, consistent with a genuine policy-induced increase.

Seventh, Panel (10) applies the synthetic difference-in-differences estimator of [Arkhangelsky et al. \(2021\)](#) with placebo tests and bootstrap inference, increasing confidence in the main results. The results closely track the baseline TWFE estimates. Eighth, Panel (11) extends the event window from 1975 to 1987 and again finds similar impacts to the baseline, with midwife deliveries rising by 1.4 percentage points or 87 percent. Finally, Panel (12) estimates the model including third-party states but controlling for their mandates; the estimated increase (44 percent) is somewhat smaller but still sizeable and statistically significant.

Eighth, we drop one state at a time from the analysis in Figure [B.6](#). The results appear similar even when omitting each individual state from the analysis. Together, these robustness checks confirm our main results and suggest that the findings are not due to an arbitrary empirical choice.

6.2 Placebo Test and Non-parametric P-values

Ninth, in the appendix, we perform a placebo test where we take the timing of the Medicaid reimbursements by state (both the staggered and national specifications), but we randomly assign this treatment timing across states using the original dates. Then, we test the placebo difference-in-difference specification over the randomly as-

signed states.²⁶ We run this simulation 2,000 times, choosing a new random assignment of states across treatment years in each iteration.

Figure B.7 shows the plotted distribution of these 2,000 placebo estimates. The vertical line indicates the true point estimate, and the simulated estimates are plotted in dots in Figure B.7. Panel A shows the national mandate in 1980, and Panel B shows the staggered adoption of the reimbursement mandate. Based on the simulated coefficient, we also calculate a non-parametric p-value from the cumulative distribution function (CDF) of simulated coefficients. The non-parametric p-value is less than 0.01 for the national specification and less than 0.05 for the staggered adoption specification.

7 Mechanisms: Where Does the Rise in Midwife Deliveries Come from?

Next, we explore the factors behind the rise in midwife-attended deliveries. Figure VI presents a series of subsample analyses and Table 2 shows interactions of the Medicaid mandate with other related state-level factors. The results suggest that Medicaid reimbursement mandates have a larger effect in states with high midwife reimbursements and higher autonomy for CNMs through scope of practice laws. We also find important supply-side changes. Following the reimbursement mandate, midwives enter areas where CNMs and midwife deliveries were previously absent, suggesting geographic expansion in midwifery care.

7.1 Policy Heterogeneity: Eligibility, Reimbursement, Parity, and Scope of Practice, HMOs

First, in Panel A of Figure VI, we separate states by baseline prenatal Medicaid eligibility (1979) from East et al. (2023). Increases in midwife deliveries are present in both high- and low-eligibility states, with overlapping confidence intervals. Table 2 similarly shows that while point estimates are somewhat larger in high-eligibility states, the differences are not statistically significant. Table 2 Column (1) also shows that the interaction of the Medicaid expansions and Medicaid reimbursement (East et al., 2023) do not explain the increase in midwife deliveries. Overall, midwife deliveries increase regardless of whether a Medicaid expansion occurred or the state has high levels of eligibility.

Second, Table 2 Column (3) examines the Medicaid reimbursement rate relative to physicians, measured as a ratio from zero to one. The interaction of reimburse-

²⁶This specification follows Chetty et al. (2009), Buchmueller et al. (2011), Ohn (2018) and Baron et al. (2020).

ment mandates with the reimbursement rate for CNMs (relative to physicians) suggests that states with higher CNM reimbursement rates experienced larger increases in midwife deliveries (Column (3)). These results are also reflected in the subsample analysis, where Panel A.1.iii shows that midwife deliveries increase mainly in states where CNMs are reimbursed equally to physicians (payer parity). The importance of reimbursements is consistent with [Beniwal et al. \(2024\)](#), demonstrating that demand-side changes under the ACA resulted in larger increases in CNM use in states with payer parity. Similarly, in our context, the impact of Medicaid reimbursement mandates is strongest where CNMs are reimbursed at rates closer to those of physicians.²⁷

Third, Medicaid reimbursement mandates appear more influential than private insurance mandates. Column (4) of Table 2 shows that while the coefficient on third-party reimbursement mandates is positive, it is statistically insignificant, and the interaction term with Medicaid mandates is negative. These results suggest that private reimbursement mandates, when adopted alone, do not drive comparable increases in CNM deliveries. Medicaid reimbursement, by contrast, had a direct and measurable impact on CNM deliveries.

Why are public reimbursements more important? One explanation is that the federal Medicaid mandate had a broader effect than the state-level third-party mandates. A national policy may have more bite than state-level decisions to mandate third-party payments. A second explanation is that Medicaid is a dominant payer for maternity care, particularly for births to low-income women, so the incentives it creates for hospitals and providers carry more weight. Another possibility is sequencing: most states implemented Medicaid reimbursement mandates before third-party mandates, meaning that the private mandates may have had little incremental effect once Medicaid had already set the reimbursement precedent. More broadly, these findings align with evidence that public insurance standards often influence the broader insurance market ([ACNM, 2024b](#)), encouraging private insurers to cover services already reimbursed under Medicaid. In this way, Medicaid mandates may have indirectly expanded CNM use beyond the Medicaid population, reducing the marginal effect of later private insurance mandates.

Fourth, SOP laws also play an important role in shaping the impact of reimbursement. Columns (5)–(6) show that increases in midwife deliveries were significantly larger in states where midwives had independent practice authority or prescriptive authority. These results are also reflected in the subsample analysis in Figure VI Panel

²⁷However, two limitations are worth noting. First, the reimbursement data on parity reflect conditions in the early 1990s ([Hoffman, 1994](#)), and payer parity standards may have differed at the time each state enacted its Medicaid mandate. A second limitation is that some states are missing this information on reimbursement level, and we lose some observations in the analysis.

A.1.iv, where the main increase in midwife deliveries occurs in non-supervisory states. These results indicate that reimbursement mandates are most effective when CNMs are legally able to practice with autonomy. When CNMs can bill directly and prescribe medications, reimbursement becomes more feasible for midwives to establish or expand their practices. By contrast, in restrictive SOP environments, reimbursement payments may flow through supervising physicians or hospitals, diluting the incentive for midwives themselves.

Fifth, the broader insurance environment may also have been a factor. HMOs expanded rapidly in the 1980s, typically operating under capitation and employing non-physician providers on a salaried basis. In such settings, the 1980 mandate likely had limited direct influence on CNM employment (OTA, 1986). We examine this possibility using the 1980 directory of HMOs (HHS, 1980). Figure VI reports results for states with and without HMO plans, while Table 2 interacts the federal mandate with both the share of a state’s population enrolled in HMOs and whether HMOs were present at all. The clearest effects of the federal mandate appear in states without HMO plans. In Table 2, the effect is also concentrated on the baseline federal reimbursement indicator rather than the interaction with HMO presence. Overall, HMO distribution alone does not appear to explain the effects of the federal mandate.

7.2 Individual Characteristics

Sixth, Panel A.2 of Figure VI and Table C.1 show that midwife deliveries rise across all subgroups by race, parity, education, and marital status. Effects are somewhat larger for white, married, and second births, groups less likely to rely on Medicaid (see Section 2.2.2), indicating that the mandate’s impact extended beyond Medicaid recipients. These broad increases suggest that reimbursement policies encouraged wider adoption of midwife care, with spillovers into privately insured populations, as public insurance standards often shape private coverage (ACNM, 2024b).

7.3 County-Level Analysis

Seventh, Figure VI Panel D examines the effect on midwife deliveries at the county level and separates by county characteristics.²⁸ Splitting by county characteristics reveals relatively stable coefficients in Panel B. The increase in midwife deliveries is not concentrated in a single county type. Specifically, midwife deliveries increase in counties with varying levels of Aid to Families with Dependent Children (AFDC) recipients (a proxy for Medicaid), counties with a higher proportion of female-headed

²⁸In this analysis, we collapse the data to the county level and include both county and year-fixed effects, as well as cluster the standard errors at the state level. The data are collapsed at the residence county level, unless otherwise noted (the bottom three subsample analyses of Figure VI).

households in poverty (another proxy for Medicaid), and counties with a high urban population share.²⁹

7.4 Midwife Deliveries Increase in Areas without Preexisting CNMs and Midwife Births

Finally, at the bottom of Panels A.1 and B.4 in Figure VI, we test whether the share of midwife deliveries increases in states and counties that had no midwife or CNM presence prior to the Medicaid reimbursement mandate. To measure CNM presence, we rely on CNM location at the county and state level available in the AHRF (AHRF, 1994). While this data does not allow us to determine whether CNM supply is increasing, due to the limited number of years available (which only includes information on CNMs for these two years), we can assess whether midwife deliveries increase in states that lacked CNMs during these pre-treatment years. If midwife deliveries increase in states without pre-existing CNM access, it would suggest that CNM supply is expanding following the implementation of the reimbursement mandate.³⁰

The state-level results in Panel A reveal a clear increase in midwife deliveries even in states that did not have active CNMs in 1977 and 1980. This suggests that the Medicaid reimbursement mandate possibly facilitated the entry of CNMs into new states. These findings also rule out reporting as the only explanation for the rise in midwife deliveries. Because there were no CNMs prior to these years, the rise in midwife deliveries appears to be partially due to the entry of CNMs into these states.

Next, Panel B.4 considers midwife access prior to the reimbursement mandate at the county level. We consider whether there is an increase in midwife deliveries in counties that had no midwife deliveries in 1979, based on the natality data, as well as no CNMs in 1977 and 1980, based on the AHRF. Figure VI shows a notable rise in midwife deliveries in counties without any midwife activity in 1979, and no CNMs in 1977 or 1980. This finding reinforces the conclusion that the supply of CNMs is indeed expanding after the mandated reimbursement, as the increase in midwife deliveries is not limited to counties with prior midwife or CNM presence. *Instead, these results indicate that CNMs enter counties and states that had no previous access to midwifery care.* These results are especially clear in Panel B.4.ii, where we measure by occurrence

²⁹The results are similar if we instead consider the effect of the 1980 mandate at the county-level, in states that passed the 1980 mandate, but consider differential effects by county characteristics. These event studies in Figure C.1 interact the event-study dummy variables with the share of each characteristic in the county, but remove state-by-year fixed effects. These results suggest that the effect is uniform within state and is absorbed by the county-level effects rather than differentially appearing in counties with different levels of particular characteristics. These characteristics include the share receiving AFDC, the share of households that are female-headed households in poverty, the share midwife deliveries, and the share of urban households.

³⁰Finally, Table 2 examines the interaction between Medicaid reimbursement mandates and baseline CNM availability from 1977 to 1979 (Columns (7)–(9)). The results indicate that midwife deliveries rise uniformly in response to the reimbursement mandate, with no differential effect in areas that already had higher CNM presence. This pattern is consistent with Figure VI, which shows that midwife deliveries increased nationwide even in counties that previously had no CNMs.

county. Midwife deliveries increase even in counties without midwife deliveries in 1979.

Importantly, these results suggest that the rise in midwife deliveries is not solely due to improved reporting of midwife deliveries. There is an increase in midwife deliveries in counties formerly without CNMs and midwives, providing strong evidence that midwives are actually entering these states and counties. These findings also indicate that, in this case, the rise in midwife deliveries is partially due to higher supply.

These findings contrast with previous research in [Markowitz et al. \(2017\)](#), [Hoehn-Velasco et al. \(2022\)](#), and [Beniwal et al. \(2024\)](#). These studies focusing on SOP changes and demand-side changes found no significant increase in CNM supply despite a rise in CNM-attended deliveries. Instead, in the mandated reimbursement setting, we observe that midwives are relocating and possibly increasing in number after the implementation of Medicaid reimbursement mandates. Our results suggest that while full practice authority, as studied in [Markowitz et al. \(2017\)](#) and [Hoehn-Velasco et al. \(2022\)](#), only impacts the number of deliveries CNMs perform, here Medicaid reimbursement mandates directly increase midwife supply. Mandated reimbursements appear to incentivize midwives to enter previously underserved regions, either through the operation of independent practices or the new hiring by hospitals in these areas ([OTA, 1986](#)). These findings highlight the distinctive role that financial incentives, such as Medicaid reimbursement, play in expanding the supply of CNM care beyond the effects of regulatory changes like full practice authority.

8 Midwife Care, Mortality, Delivery Outcomes

We next examine whether the reimbursement mandate influences delivery and mortality outcomes for mothers and newborns. Prior research links midwife care to lower intervention rates and improved outcomes,^{[31](#)} and a rise in midwife deliveries may plausibly translate into better health. Data constraints limit what we can measure before 1989, since birth certificates lack detailed information on delivery method and morbidity outcomes.^{[32](#)} We therefore focus on birth weight, gestational age, and prenatal care from birth records, along with mortality data from [NCHS/NVSS \(1975-1985\)](#).

To evaluate health outcomes after the federal reimbursement mandate, our empirical strategy exploits cross-county heterogeneity in the extent to which midwife deliveries increase after the mandate. Some counties saw large increases in midwife-

³¹See [Sandall et al. \(2016\)](#); [Attanasio and Kozhimannil \(2018\)](#); [Carlson et al. \(2018\)](#); [Neal et al. \(2019\)](#); [Dubay et al. \(2020\)](#); [Wallace et al. \(2024\)](#).

³²For the detailed birth certificate, see [Figure A.4](#).

attended deliveries, while others saw smaller changes. We use this heterogeneity to test whether maternal and newborn outcomes improve most where midwife presence expands. This design improves on state-level analyses by capturing differential local exposure to the increase in midwife use after the reimbursement mandate.³³ More formally, we examine the effect of the mandate on birth outcomes in county j , state s , and year t as:

$$\begin{aligned} \text{Birth Outcome}_{jst} = & \alpha + \beta_1 \text{Mandate}_{st} + \beta_2 (\text{Mandate}_{st} \times \Delta \text{Midwife}_j) \\ & + \mathbf{X}'_{jt} \gamma + \mu_j + \eta_t + \Delta \text{Midwife}_{jst} \times \delta_t + \epsilon_{jst} \end{aligned} \quad (2)$$

where $\text{Birth Outcome}_{jst}$ is birth weight, gestation, or mortality. Mandate_{st} equals one in states implementing the federal mandate. $\Delta \text{Midwife}_j$ is the county-level change in midwife deliveries between 1980 and 1985. The interaction $\text{Mandate}_{st} \times \Delta \text{Midwife}_j$ captures whether outcomes improved more in counties where midwife access expanded. Focusing on the interaction term captures the fact that the federal reimbursement mandate can influence outcomes only to the extent that it expands access to midwife care. We also include county and year fixed effects. As well as the interaction of the change in midwife deliveries with year fixed effects $\Delta \text{Midwife}_{jt} \times \delta_t$, which captures the baseline effect of the change in midwife deliveries in each year. Standard errors are clustered at the state level.

Table 3 displays the effects of the Medicaid reimbursement mandate on delivery outcomes at the county level. Table 3 presents the grouped post-period estimates from the federal reimbursement of CNMs through Medicaid (Equation 1). At the bottom of each panel, we report the Minimum Detectable Effects (MDEs) on the baseline indicator as recommended by Bloom (1995); Duflo et al. (2007); Haushofer and Shapiro (2016).³⁴

The results in Table 3 Panel A show no consistent changes in birth weight or gestational age. Across Columns (1)–(7), the coefficients on the mandate and the interaction with the change in midwife deliveries are statistically insignificant. Panel B aligns with Panel A, suggesting little statistically significant change in gestational length measured in weeks or the timing of prenatal care initiation.

In Panel C, we examine mortality outcomes. Here, the baseline mandate indicator

³³We also explored a Bartik-style IV approach using baseline midwife deliveries interacted with the national mandate as an instrument. However, the first stage is weak, and the instrument does not provide sufficient power.

³⁴To assess the precision of our estimates, we report *minimum detectable effects* (MDEs) following Bloom (1995); Duflo et al. (2007); Haushofer and Shapiro (2016). The MDE is defined as the smallest effect detectable with 80% power at the 5% significance level: $MDE = (t_{1-\kappa} + t_{\alpha/2}) \times SE(\hat{\beta})$ which simplifies to approximately $2.8 \times SE(\hat{\beta})$ for $\kappa = 0.80$ and $\alpha = 0.05$. Similar to Haushofer and Shapiro (2016), we report MDEs both in outcome units and, for interpretability, as a percent of the control mean.

is associated with higher infant and maternal mortality. However, the interaction with midwife deliveries shows reductions in mortality in counties with larger changes in midwife use after the mandate. These results indicate that infant mortality increased after the mandate, but the increase in mortality on the baseline indicator is offset in counties with larger increases in midwife use.

9 Hospital Expenses, Employment, and Wages

9.1 Midwife Reimbursement Mandates and Hospital Expenses

Next, we assess whether mandated Medicaid reimbursement for CNMs affects hospital-level expenditures. Classic work on physician labor supply emphasizes that delegation and task-shifting can raise the efficiency of physicians (Reinhardt, 1972; Thurston and Libby, 2002), which could in turn lower costs. Better reimbursement for NPP services may affect whether NPPs act as substitutes, reducing costs, or as complements, which could expand staff and increase expenditures.

Though, because obstetric services account for only a small share of hospital budgets, reimbursement requirements are expected to have a minimal impact on overall hospital operating costs, but instead have a larger influence on employment patterns (OTA, 1986). Costs might even rise. CNMs often spend more time with patients than physicians. Furthermore, CNM involvement could lead to duplicate visits and lab procedures if patients also saw a physician, and this overall increase in service volume could offset lower reimbursement rates (OTA, 1986). Ultimately, any potential savings could be diminished or reversed if duplication and higher utilization outweighed the gains from physician efficiency (OTA, 1986, pp. 11, 55).

To test these predictions, we draw on county hospital expenditure data from the Area Health Resource File (AHRF, 1994), which reports nurse salary expenses, total salary expenses, and overall hospital operating costs in 1980 and 1985.³⁵ We restrict the sample to counties that report the same number of hospitals in both years. We estimate a specification similar to Equation 2, but limited to 1980 and 1985, and include controls for the number of hospitals reporting.

The results in Table 4 indicate that the mandate did not reduce hospital costs. On the contrary, we observe modest but statistically significant increases in nurse salary expenses in counties with greater midwife growth. In addition, total salary expenses and overall hospital expenditures increase, although these increases are primarily driven by the baseline federal mandate rather than by differential increases in

³⁵A limitation of this AHRF data is that it only reports aggregate costs and salary expenses, rather than specifically for obstetric services.

midwife use.

Taken together, rather than reducing costs, reimbursement mandates appear to increase costs, especially those related to nurse salaries. This result is consistent with hospitals expanding midwife roles rather than substituting them for physicians. In this sense, the CNM reimbursement mandate illustrates a broader point: the reimbursement mandate operates less as a cost-control instrument than as a labor-market regulation that influences employment and compensation (OTA, 1986), a point we explore next.

9.2 Midwife Labor Supply and Wages: BLS Clinical Specialists and the Federal Reimbursement Mandate

A central question is whether Medicaid reimbursement shifted hospital demand for CNM services. Hospitals may hire CNMs following the reimbursement mandate as either a substitute for physician care or as a complement, expanding services as parallel staff members (Reinhardt, 1972; OTA, 1986; Brown, 1988; Thurston and Libby, 2002). As suggested by Reinhardt (1972); Brown (1988); Thurston and Libby (2002), physicians underutilize delegation to qualified nurses (or other providers). One of the limiting factors in this delegation is the payment rules that reward physician services over those of non-physician providers. Without reimbursement potential, hospitals and clinics have little incentive to integrate CNMs (or other NPPs) into their care networks (OTA, 1986). In the 1970s, the absence of a federal payment mandate was a major barrier to hiring NPs, PAs, and CNMs (OTA, 1986).

To evaluate this prediction, we digitize city-year data on hospital nursing wages from BLS (1977, 1980, 1984) and estimate a difference-in-difference-in-differences model that contrasts *clinical specialists* with other nursing categories before and after the federal reimbursement mandate. In the BLS definition, clinical specialists nurses comprise medical-surgical, OB/GYN, pediatrics, psychiatric, and related fields (BLS, 1984, pg. 152). CNMs are most likely to be included in the OB-GYN category of clinical specialists, a category that requires an advanced nursing degree and specialization in obstetric care.

We consider a difference-in-differences-in-differences (DDD) specification, comparing the wages and employment of clinical specialists to those of other hospital-based nursing categories. The DDD comparison groups consist of directors of nursing, supervisors of nurses, head nurses, nurse anesthetists, general duty nurses, and nursing instructors within the same metropolitan area and year.

The DDD results presented in Table 5 show two clear patterns. First, there is

no detectable wage premium for clinical specialists as a whole after the federal reimbursement mandate (Columns (3)–(4)). However, in the OB/GYN category, which is the most representative of CNMs, these clinical specialists do experience higher relative wages after the mandate. The OB/GYN interaction terms are 0.090 and 0.051 in Columns (5)–(6), translating to a roughly 9–10% and 5–6% wage gain relative to other nursing categories after the mandate. Second, considering employment in Columns (7)–(12), clinical-specialist employment clearly rises after the mandate. The clinical specialist interaction in Columns (9)–(10) suggests a relative rise in clinical specialist employment after the federal mandate. OB/GYN specialists’ employment, in particular, also increases, with coefficients of 0.175 and 0.208 in Columns (11)–(12), or a roughly 19–23% relative increase in employment.³⁶

Taken together, our results align with the prediction that reimbursement makes hospitals more willing to employ midwives but would not necessarily generate cost savings (OTA, 1986). Hospitals expanded staffing in OB/GYN specialties and paid those specialists higher wages. While the OB/GYN clinical-specialist category is not labeled “CNM,” its definition makes it the closest proxy for CNM roles in these BLS data. The evidence suggests that the Medicaid reimbursement mandate contributed to both higher employment and higher wages for hospital-based obstetric nursing specialists, consistent with a supply-side response to the new payment rules.

10 Conclusion

This paper provides evidence that reimbursement mandates can influence health-care labor markets. We focus on the 1980 OBRA, which required Medicaid programs to reimburse CNMs through coverage and direct payment (OTA, 1986). By eliminating the reimbursement penalty that had historically discouraged CNM use, the mandate increased midwife-attended births by 1.1 percentage points, an 80 percent rise relative to the baseline, resulting in an additional 5,500–12,000 midwife deliveries annually across the 11 states of focus. Nearly one-half of the increase in midwife use from 1975 to 1985 (in adopting states) can be traced to this federal reform.

We also show that the effects of the mandate were not uniform. The increase in midwife deliveries was largest in states with greater autonomy for CNMs, and states where the CNM reimbursement rate was closer to (or on par with) physician reimbursement levels. Deliveries also expand into counties with no prior CNM or midwife presence, highlighting that the policy encouraged entry and geographic diffusion of midwives. Consistent with this supply-side interpretation, hospitals increased employment and wages for OB/GYN clinical specialists, the nurse category most closely

³⁶The smaller sample in the OB/GYN columns reflects the fact that this specialty is reported for a subset of metro areas.

aligned with CNMs. These labor market adjustments imply that Medicaid reimbursement mandates not only shifted the distribution of deliveries but also the supply and compensation of CNMs.

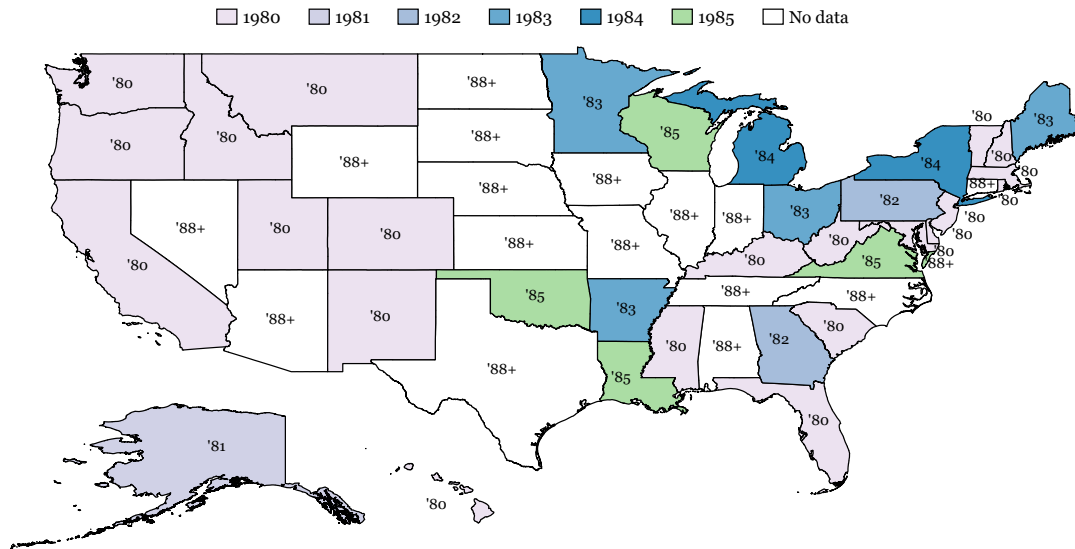
Our results provide evidence that reimbursement mandates partially operate as labor market regulation. By redefining which services are compensated and at what rate, the mandate alters occupational entry and wages. The magnitude of the increase in midwife deliveries with reimbursement is comparable to that of SOP laws (Markowitz et al., 2017; Hoehn-Velasco et al., 2022). However, reimbursement may exert a broader influence, as we find evidence of employment growth, whereas SOP reforms generally shift the distribution of deliveries without expanding the overall extensive margin labor supply (Markowitz et al., 2017; Markowitz and Adams, 2022; Hoehn-Velasco et al., 2022; Beniwal et al., 2024).

The case of midwifery illustrates a broader lesson for non-physician providers: reimbursement rules shape not only compensation but also patterns of employment (Phillips, 1995; Kleiner and Krueger, 2013; Chen et al., 2023). Evidence from related settings highlights that payment policy alters professional roles, workforce composition, and market organization, underscoring the central role of reimbursement design in healthcare labor markets (Gittleman et al., 2018; Barnes et al., 2017; Chen et al., 2023; Beniwal et al., 2024). For contemporary debates over healthcare delivery, reimbursement should therefore be understood as a regulatory lever with overarching implications for workforce distribution and the costs of care (Kleiner, 2016; Kleiner and Xu, 2025; Markowitz et al., 2017; Chen et al., 2023; Beniwal et al., 2024; Eck, 2021).

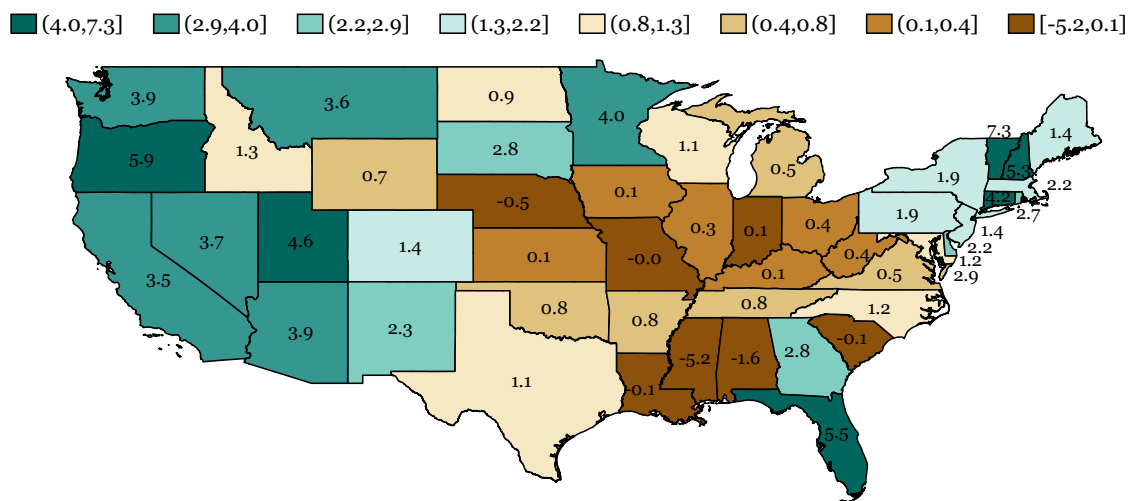
11 Figures

Figure I: Background—CNM Medicaid Reimbursement Dates and Midwife Deliveries

Panel A: Dates of CNM Medicaid Reimbursement

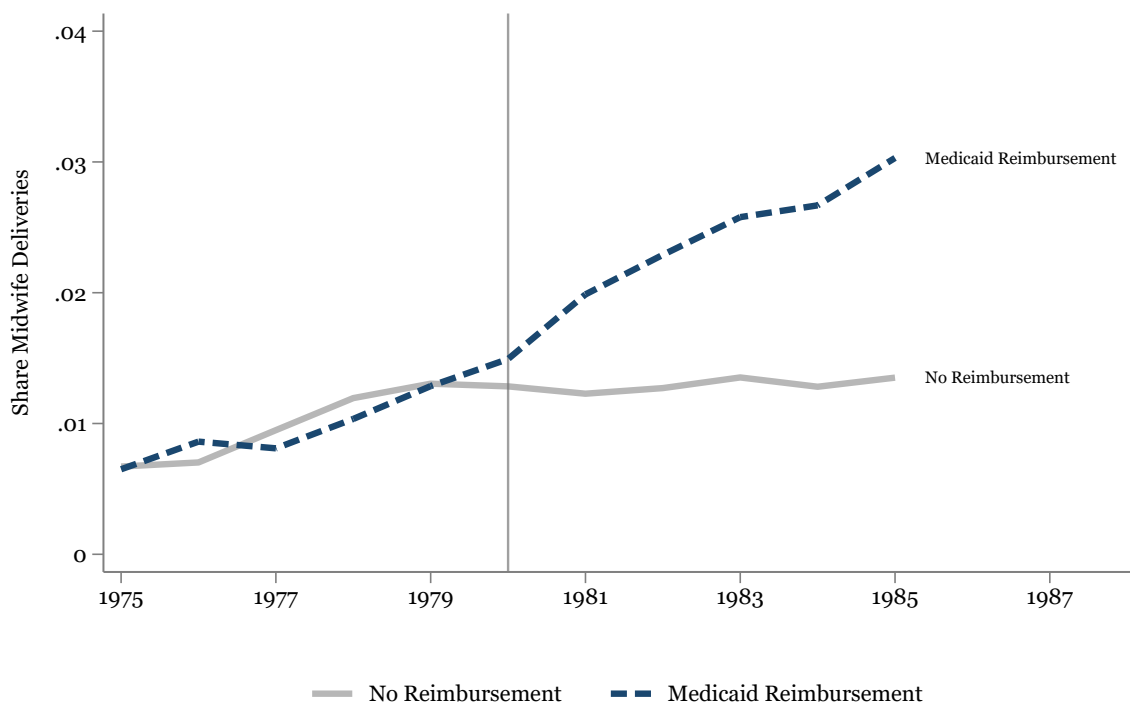


Panel B: Change in Percent Midwife Deliveries, 1975-1985



NOTES AND SOURCES: Panel A maps the state-level adoption of the federal mandate to reimburse CNMs through Medicaid. Dates come from state-level CNM policies published in the *Journal of Nurse-Midwifery*. Panel B maps the change in midwife deliveries over 1975-1985, or the share of midwife deliveries in 1985 minus the share of midwife deliveries in 1975. This change in the share of midwife deliveries comes from the authors' calculations based on the aggregate vital statistics data. See Figure A.7 for the individual years and the percent of deliveries by midwives.

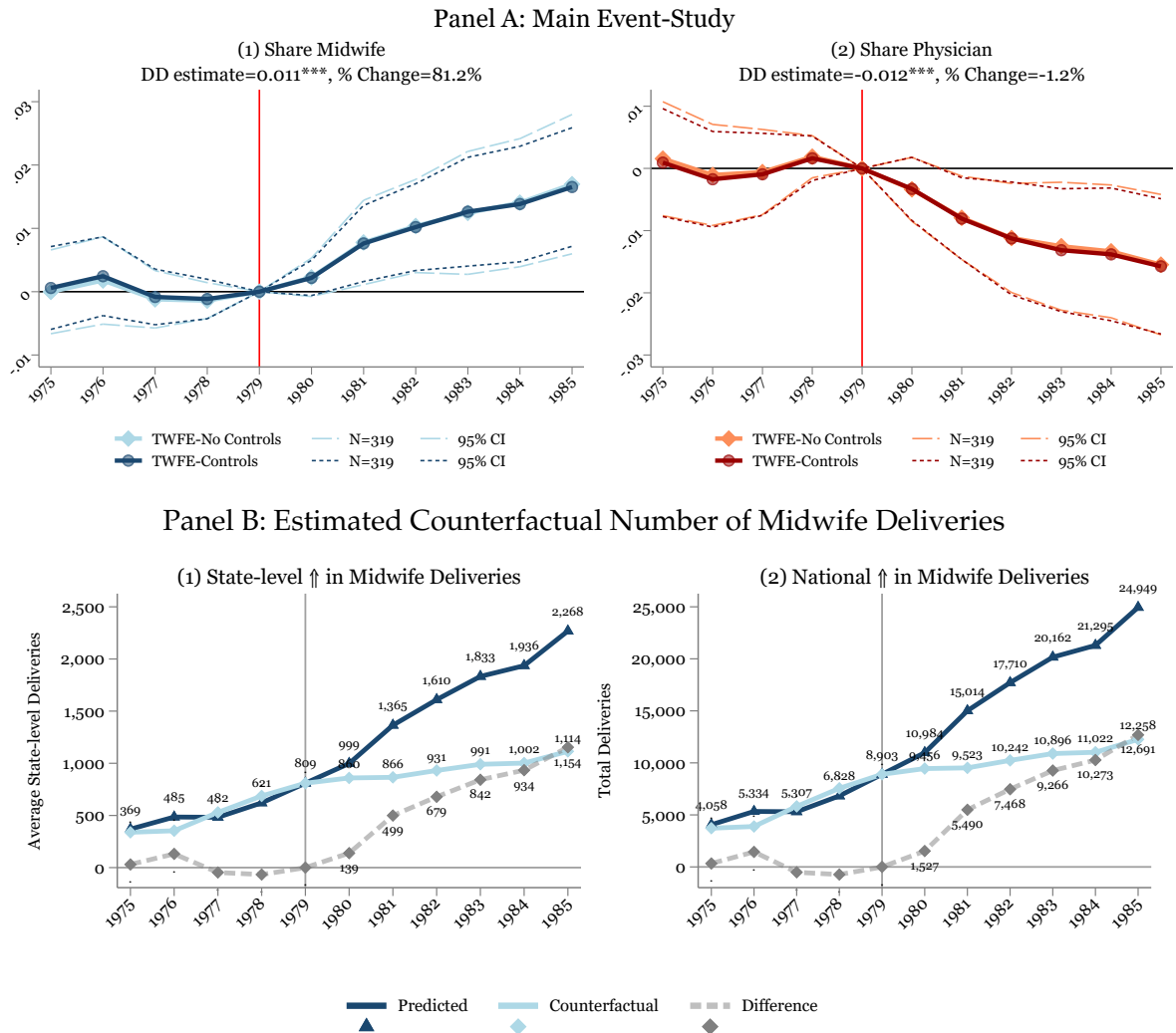
Figure II: Background—Trends in the Share of Midwife Deliveries by Adoption of Federal CNM Medicaid Reimbursement



SOURCE: Vital Statistics Natality Birth Data (Birth Certificate Records) from the National Vital Statistics System of the National Center for Health Statistics.

NOTE: Shows the trend in midwife deliveries by states with and without the national reimbursement mandate. Sample includes individuals where the resident and occurrence state correspond. The main sample excludes states that passed third-party reimbursement mandates.

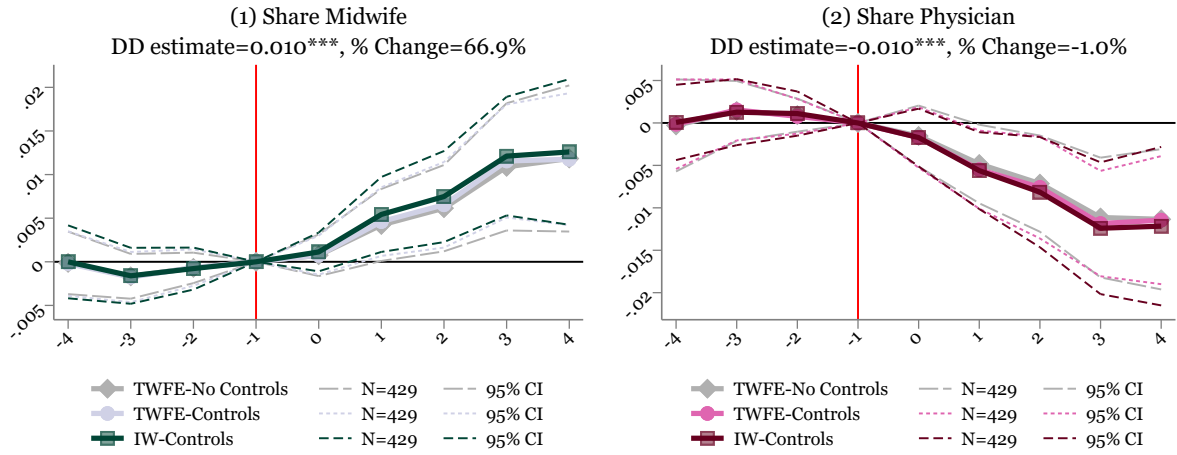
Figure III: Main Results–Federal Medicaid Mandated CNM Reimbursements



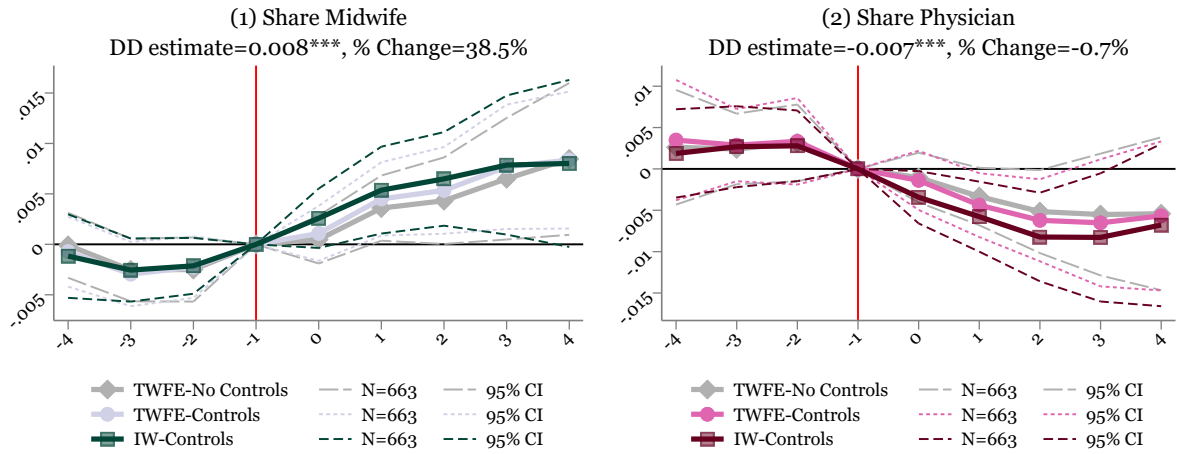
NOTES: In Panel A, OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted points represent coefficients on dummy variables representing each year of delivery before and after the 1980 national mandated CNM reimbursement. $m = 1979$ is the excluded period. Solid lines represent point estimates. Dashed and dotted lines display the 95 percent confidence intervals, with robust standard errors clustered at the state level. TWFE represents two-way fixed effects. Data collapsed at the state and year of delivery and conveys the average state-level effect. Controls include the average maternal age from the birth certificates, the state-level prenatal Medicaid eligibility and Medicaid expansions reported in [East et al. \(2023\)](#), the log of the number of physicians per 1,000 ([AHRF, 1994](#)), and the share of reproductive-age females with both a high school and college education ([Ruggles et al., 2021](#)). The years of the sample include 1975 to 1985. Sample includes individuals where the resident and occurrence state correspond. The main sample excludes states that passed third-party reimbursement mandates. The national sample also excludes states that passed reimbursement mandates between 1980 and 1985. Grouped post-period represents period 1 (1981) onward. 29 units included in the main analysis (11 treated: CA, CO, DE, HI, ID, KY, MT, RI, SC, VT, WA, and untreated AL, AZ, DC, IA, IL, IN, KS, LA, MO, NC, ND, NE, OK, TN, TX, VA, WI, WY).

In Panel B, for the counterfactual trends, the **left panel** plots the average state-level effect on the number of CNM-attended deliveries (treated states only); the **right panel** graphs the national effect in the 11 states that passed Medicaid reimbursement mandates (keeping treated states only). Each panel shows three series. (i) The dark blue line shows the predicted values, which are fitted values from the main event-study regression computed using `predict, xbd` multiplied by the number of births. (ii) The light blue Counterfactual lines remove the mandate's contribution at each event time. The counterfactual is constructed by subtracting, for each event time, the estimated coefficients on the mandate event-time indicators. (iii) The gray lines show the difference between the predicted and counterfactual values. The vertical line marks the year before the 1980 federal Medicaid reimbursement mandate.

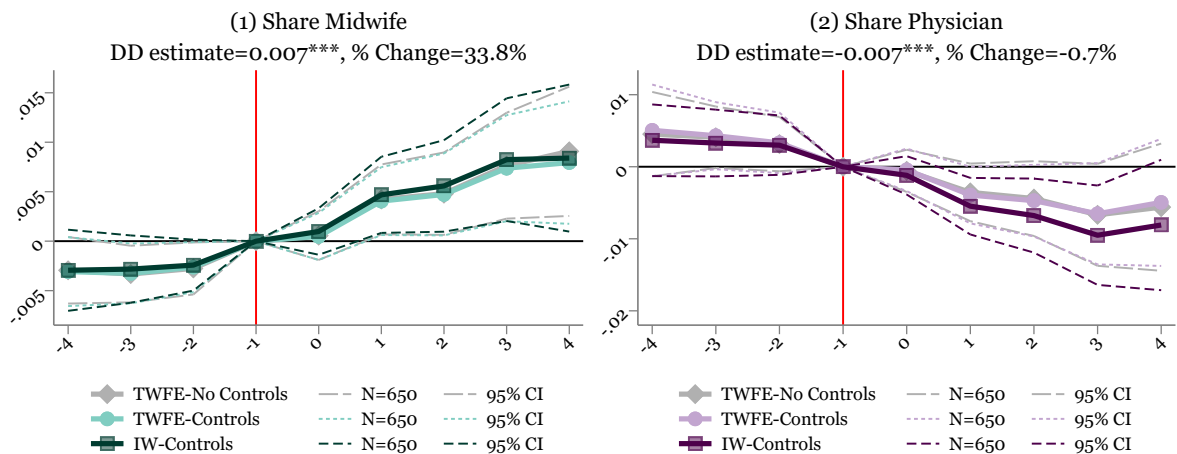
Figure IV: Main Results–Alternative Reimbursement Measures, 1975-1987
Panel A: Staggered Medicaid Reimbursements, No Third-Party States



Panel B: Staggered Medicaid Reimbursements, All States



Panel C: First Reimbursement Mandate, Medicaid or Third Party



NOTES: Alternative colors signify different policies considered from Figure III. The results presented above are similar to Figure III, but represent the staggered adoption of policies (Equation IV). In the above graph, the excluded period is $m = -1$ and the endpoints are binned at $m = -5$ and $m = 5$, but the endpoints are not shown in the graph. TWFE represents two-way fixed effects. IW represents the Interaction Weighted estimator from Sun and Abraham (2021). Years include 1975-1987. Panels A and B display the staggered Medicaid reimbursement mandates, while Panel C shows the first reimbursement mandate in the state (third party or Medicaid). Panel A reports staggered Medicaid reimbursement mandates (32 states and DC, excluding states that passed third-party mandates by 1986). Panel B reports staggered Medicaid mandates, controlling for third-party mandates (50 states + DC, excluding states that adopted Medicaid mandates between 1985 and 1987). Panel C reports the first reimbursement mandate enacted in each state (Medicaid or third-party), excluding states with first mandates before 1975 or between 1985 and 1987 (49 states and DC, excluding WA).

(1) Log of Deliveries
DD estimate=0.953***

(2) Removing Linear Pre-trend
DD estimate=0.011***

(3) Income & Share Married Controls
DD estimate=0.011***, % Change=81.2%

(4) Race-by-Age and Birth Order Controls
DD estimate=0.010**, % Change=73.8%

(5) All Extra Controls
DD estimate=0.010***, % Change=73.8%

(6) Dropping Expansions
DD estimate=0.012**, % Change=87.5%

(7) With Weights
DD estimate=0.007***, % Change=47.0%

(8) Wild-Cluster Bootstrap SE

(9) Assessing Pre-trends with 50% Power

(10) Synthetic DiD, Arkhangelsky et al. (2021)
ATT=0.011 SE=0.002

(11) 1980 National Change, 1975-1987
DD estimate=0.014***, % Change=86.9%

(12) ALL National w/3rd Party Controls
DD estimate=0.008**, % Change=43.5%

Legend for (1)-(7):

- ◆ TWFE-No Controls
- ◆ TWFE-Controls
- N
- 95% CI

Legend for (10):

- 95% CI/Upper & Lower
- ◆ Point Estimates

Legend for (8):

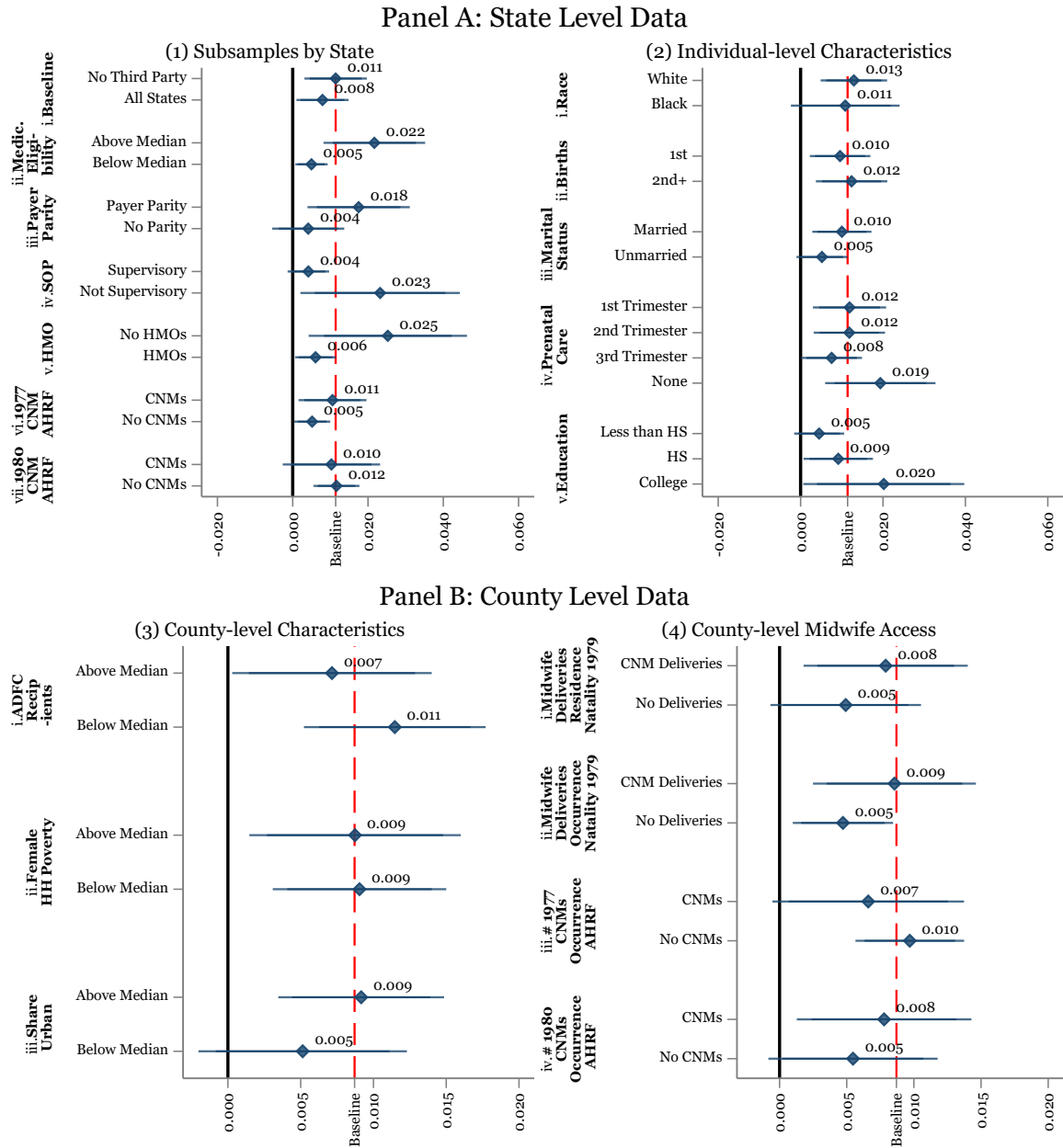
- 95% CI
- TWFE-Controls

Legend for (9):

- Estimated Coefs
- Hypothesized Trend
- Expectation After Pre-testing

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Figure VI: Mechanisms–Subsample Analysis, Share Midwife Deliveries



NOTES: The red vertical line marks the baseline coefficient, and the black vertical line marks zero. Panel A reflects the state-level grouped post-period from Figure III and Equation 1, except considering subsample analyses. Panel B shows subsample analysis with the county-level specification that includes county fixed effects and year fixed effects. Standard errors clustered at the state level. County-level controls include the average maternal age and the log of the number of physicians (AHRF, 1994). For the county-level specification, weights are applied (due to a large number of counties with few births). Note that the baseline increase in midwife deliveries is different between the state-level specification (Panel A) and the county-level specification (Panel B).

12 Tables

Table 1: Data–Summary Statistics, 1975-1979 (Pre-Adoption Years)

	(i) National Mandate					(ii) Staggered Adoption				
	Medicaid Reimbursement		No Mandate		Diff.	Medicaid Reimbursement		No Mandate		Diff.
	Mean	Std. Dev.	Mean	Std. Dev.	Est.	Mean	Std. Dev.	Mean	Std. Dev.	Est.
Provider Units										
Share Midwife	0.009	0.012	0.010	0.013	-0.000	0.008	0.011	0.011	0.014	-0.003
Physician Deliveries	0.983	0.013	0.986	0.017	-0.002	0.985	0.012	0.984	0.019	0.002
Non-Midwife/Non-Physician Providers	0.007	0.006	0.005	0.007	0.003**	0.006	0.007	0.005	0.008	0.001
Location										
In-Hospital Deliveries	0.988	0.006	0.992	0.005	-0.004***	0.990	0.006	0.991	0.005	-0.002
Non-Hospital Deliveries	0.012	0.006	0.008	0.005	0.004**	0.010	0.006	0.008	0.006	0.002
Share Midwife in Hospital	0.007	0.011	0.007	0.012	-0.000	0.006	0.010	0.008	0.013	-0.002
Share Midwife not in Hospital	0.003	0.003	0.003	0.005	-0.000	0.002	0.002	0.003	0.006	-0.001
Prenatal										
1st Trimester Prenatal	0.753	0.052	0.737	0.063	0.016*	0.752	0.052	0.732	0.062	0.020**
2nd Trimester Prenatal	0.200	0.039	0.206	0.036	-0.006	0.200	0.037	0.210	0.033	-0.009
3rd Trimester Prenatal	0.039	0.012	0.044	0.019	-0.005*	0.040	0.014	0.044	0.019	-0.004
Number of Prenatal Visits	10.153	1.215	9.885	1.629	0.268	10.228	0.939	9.740	1.831	0.489*
Month Prenatal Care	2.900	0.180	2.929	0.178	-0.030	2.903	0.178	2.940	0.167	-0.037
Weight										
Birth Weight (kg)	3.321	0.060	3.320	0.072	0.001	3.323	0.057	3.319	0.076	0.004
LBW	0.068	0.011	0.072	0.017	-0.004*	0.070	0.012	0.072	0.018	-0.003
NBW-L	0.352	0.038	0.346	0.036	0.007	0.348	0.034	0.346	0.038	0.002
NBW-H	0.482	0.030	0.482	0.033	0.001	0.482	0.027	0.481	0.035	0.000
HBW	0.097	0.020	0.100	0.021	-0.003	0.099	0.018	0.099	0.022	0.000
Gestation										
Gestation	39.625	0.136	39.558	0.255	0.067*	39.596	0.174	39.577	0.260	0.019
Premature	0.084	0.015	0.091	0.020	-0.008**	0.088	0.017	0.090	0.021	-0.002
Term	0.576	0.019	0.573	0.017	0.002	0.574	0.018	0.572	0.016	0.002
Post-dates	0.339	0.017	0.333	0.032	0.005	0.337	0.023	0.336	0.032	0.000
Apgar										
5-min Apgar	8.568	2.076	9.039	0.122	-0.472	8.481	2.308	9.026	0.125	-0.544
1-min Apgar	30.798	37.864	33.274	38.704	-2.477	37.008	40.206	27.352	34.325	9.656
Provider										
MDs	6,515.873	12748.765	5,985.033	4,919.858	530.839	6,207.716	9,936.118	6,066.200	5,510.729	141.516
CNMs 1980	5.636	10.366	4.222	6.573	1.414	5.158	8.693	4.429	7.290	0.729
CNMs 1977	9.909	13.550	11.278	18.411	-1.369	8.158	10.873	12.929	20.524	-4.771*
N	55		90		145	95		70		165

SOURCE: Vital Statistics Natality Birth Data (Birth Certificate Records) from the National Vital Statistics System of the National Center for Health Statistics. Provider estimates from [AHRF \(1994\)](#).

NOTES: Sample includes individuals where the resident and occurrence state correspond. The main sample excludes states that passed third-party reimbursement mandates.

Table 2: Mechanisms–Federal Medicaid Mandated CNM Reimbursements $\times$ Other Policies

	Outcome: Share Midwife Deliveries											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Medicaid Expansions	Prenatal Medicaid Eligibility	CNM Reimb- ursement Rate	Third Party Reimb- ursement	SOP	Prescriptive Authority	Share HMO	Any HMO	1977 CNMs	CNMs Deliveries 1977	CNM Deliveries 1978	CNMs Deliveries 1979
1(Federal Mandate)=1	0.0115** (0.0049)	0.0039 (0.0049)	-0.0457 (0.0270)	0.0094** (0.0037)	0.0068** (0.0025)	0.0080*** (0.0026)	0.0148** (0.0060)	0.0255*** (0.0090)	0.0131** (0.0052)	0.0129*** (0.0046)	0.0104*** (0.0034)	0.0068* (0.0040)
1(Federal Mandate)=1 $\times$ 1(Medicaid Expansion)=1	-0.0005 (0.0058)											
1(Federal Mandate)=1 $\times$ State Prenatal Medicaid Eligibility		0.0486 (0.0416)										
1(Federal Mandate)=1 $\times$ CNM Reimbursement Rate			0.0006* (0.0003)									
1(Federal Mandate)=1 $\times$ 1(Third Party Reimbursement)=1				-0.0054 (0.0039)								
1(Federal Mandate)=1 $\times$ 1(Collaborative)					0.0210 (0.0144)							
1(Federal Mandate)=1 $\times$ 1(Independent)					0.0087** (0.0037)							
1(Federal Mandate)=1 $\times$ 1(Prescriptive)=1						0.0130 (0.0098)						
1(Federal Mandate)=1 $\times$ Share HMO Members							-0.1200 (0.0758)					
1(Federal Mandate)=1 $\times$ 1(Any HMO)=1								-0.0194** (0.0090)				
1(Federal Mandate)=1 $\times$ CNMs 1977									-0.0002 (0.0002)			
1(Federal Mandate)=1 $\times$ Share Initial Midwife Deliveries										-0.1649 (0.2012)	0.0935 (0.2718)	0.3359 (0.3959)
1(Third Party Reimbursement)=1				0.0027 (0.0033)								
1(Prescriptive)=1						0.0094** (0.0036)						
N	319	319	286	462	319	319	319	319	319	319	319	319
Adjusted R-squared	0.809	0.812	0.837	0.816	0.835	0.844	0.820	0.845	0.811	0.810	0.809	0.814
Mean Dependent	0.014	0.014	0.014	0.018	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Year and State FE	X	X	X	X	X	X	X	X	X	X	X	X
Controls	X	X	X	X	X	X	X	X	X	X	X	X

NOTES: Reflects grouped post-period from Figure III, except for interacting the federal Medicaid reimbursement mandate with various state-level characteristics. Data for Medicaid eligibility from East et al. (2023). Data for reimbursement rates from Hoffman (1994). Third-party mandates from Miller (2006). Policy data comes from state-level CNM policies published in the *Journal of Nurse-Midwifery*. HMO data from HHS (1980).

Table 3: Mechanisms–Federal Mandate $\times$ Change Midwife Deliveries, County Level

Panel A: Birth Weight and Gestation							
	Birth Weight				Gestation Weeks		
	(1) LBW	(2) NBW-L	(3) NBW-H	(4) HBW	(5) <37	(6) 37-40	(7) 41+
1(Mandate)=1	0.0008 (0.0006)	0.0021 (0.0017)	-0.0021 (0.0013)	-0.0008 (0.0009)	0.0012 (0.0015)	0.0033 (0.0020)	-0.0044 (0.0028)
1(Mandate)=1 $\times$ '80-'85 Δ Midwife Deliveries	0.0075 (0.0066)	0.0082 (0.0200)	0.0111 (0.0161)	-0.0257 (0.0153)	0.0003 (0.0128)	-0.0128 (0.0209)	0.0148 (0.0224)
N	19,272	19,272	19,272	19,272	17,890	17,890	17,890
Adjusted R-squared	0.727	0.806	0.726	0.765	0.725	0.561	0.711
Control Mean	0.061	0.326	0.500	0.113	0.091	0.597	0.310
MDE (80% Power, 5% Significance)	0.0017	0.0047	0.0038	0.0026	0.0041	0.0057	0.0078
MDE % of Control Mean	2.8%	1.4%	0.8%	2.3%	4.5%	1.0%	2.5%
Panel B: Other Outcomes							
	Gest- ation	Birth Weight	Prenatal				
	(1) Weeks	(2) kg	(3) 1st Trimester Prenatal Care	(4) 2nd Trimester Prenatal Care	(5) 3rd Trimester Prenatal Care	(6) No Prenatal Care	(7) Month Prenatal
1(Mandate)=1	-0.0190 (0.0143)	-0.0039 (0.0028)	0.0048 (0.0120)	-0.0016 (0.0068)	-0.0018 (0.0044)	-0.0014 (0.0010)	-0.0154 (0.0471)
1(Mandate)=1 $\times$ '80-'85 Δ Midwife Deliveries	0.0838 (0.1887)	-0.0315 (0.0298)	0.0316 (0.1844)	-0.0152 (0.1335)	0.0055 (0.0516)	-0.0219 (0.0156)	0.0009 (0.6687)
N	17,890	19,272	19,010	19,010	19,010	19,010	19,010
Adjusted R-squared	0.792	0.890	0.833	0.795	0.725	0.686	0.809
Control Mean	39.466	3.365	0.762	0.187	0.039	0.011	2.776
MDE (80% Power, 5% Significance)	0.0401	0.0078	0.0335	0.0191	0.0123	0.0029	0.1319
MDE % of Control Mean	0.1%	0.2%	4.4%	10.2%	31.5%	26.4%	4.8%
Panel C: Mortality Outcomes							
	Apgar	Log of Mortality			Mortality		
	(1) 5-min	(2) Neonatal	(3) Infant	(4) Maternal	(5) Neonatal	(6) Infant	(7) Maternal
1(Mandate)=1	-0.0190 (0.0143)	0.0494 (0.0294)	0.0584*** (0.0163)	0.3208*** (0.0903)	0.9051*** (0.1890)	1.1289*** (0.2003)	0.0002 (0.0095)
1(Mandate)=1 $\times$ '80-'85 Δ Midwife Deliveries	0.0838 (0.1887)	-0.3611 (0.4245)	-0.7154** (0.2643)	-12.9096*** (3.9763)	-4.0452 (3.6684)	-9.0200** (3.7967)	-0.0365 (0.2168)
N	17,890	15,065	16,501	731	19,270	19,270	19,270
Adjusted R-squared	0.792	0.410	0.409	0.576	0.340	0.384	0.022
Control Mean	39.466	1.863	2.328	-2.165	6.701	10.596	0.075
MDE (80% Power, 5% Significance)	0.0401	0.0824	0.0456	0.2527	0.5291	0.5608	0.0267
MDE % of Control Mean	0.1%	4.4%	2.0%	11.7%	7.9%	5.3%	35.6%
Year and County FE	X	X	X	X	X	X	X
Δ Midwife Deliveries $\times$ Year FE	X	X	X	X	X	X	X
Controls	X	X	X	X	X	X	X

NOTES: Reflects results from Equation 2. The interaction term equals the difference between the share of midwife deliveries in 1985 and 1970. Standard errors are clustered at the state level, while fixed effects were included at the county and year levels. For the county-level specification, weights are applied (due to a large number of counties with few births).

Table 4: Mechanisms–County-level Hospital Expenses

	Log of Nurse Salary Expenses	Log of Salary Expenses	Log of Expenses
	(1)	(2)	(3)
1(Mandate)=1	0.0202 (0.0275)	0.0431* (0.0231)	0.0663*** (0.0213)
1(Mandate)=1 × '80-'85 Δ Midwife Deliveries	0.7480* (0.4161)	0.2375 (0.3989)	0.2595 (0.3829)
N	2,786	2,672	2,424
Adjusted R-squared	0.974	0.979	0.976
County and Year FE	X	X	X
Number of Hospital FE	X	X	X
Controls	X	X	X
Δ Midwife x Year FE	X	X	X

NOTES: Reflects grouped county-level post-period from Table 3/ Equation 2. The presented results exclude states with third-party payments. Expense data from [AHRF \(1994\)](#), but only reported in 1980 and 1985. This sample only includes counties that report expenses in both 1980 and 1985. We also only include counties where the same number of hospitals reported in 1980 and 1985, to avoid changes in expenses coming from changes in the number of operating hospitals. Robust standard errors are clustered at the state level. ***, **, * represent statistical significance at 1, 5, and 10 percent levels.

Table 5: Mechanisms–Hospital Nurse Employment and Nurse Wages

	Log of Wages						Log of Employment					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1(Mandate)=1	0.0016 (0.0238)	0.0129 (0.0184)	0.0062 (0.0217)	0.0175 (0.0170)	0.0095 (0.0248)	0.0254 (0.0140)	0.1618 (0.0898)	0.2010* (0.0947)	0.0635 (0.0994)	0.0962 (0.0923)	0.0863 (0.1042)	0.1311 (0.1257)
1(Mandate)=1 × 1(Clinical Specialist)=1			-0.0385 (0.0276)	-0.0356 (0.0276)					0.8206* (0.3626)	0.8098* (0.3656)		
1(Mandate)=1 × 1(Clinical Specialist, OB/GYN)=1					0.0895*** (0.0104)	0.0513*** (0.0103)					0.1738** (0.0687)	0.2140** (0.0658)
N	347	347	347	347	335	335	347	347	347	347	335	335
Adjusted R-squared	0.969	0.971	0.969	0.971	0.968	0.971	0.837	0.834	0.840	0.838	0.849	0.847
City and Year FE	X	X	X	X	X	X	X	X	X	X	X	X
Nurse Category FE	X	X	X	X	X	X	X	X	X	X	X	X
Controls		X		X		X		X		X		X

NOTES: Data from [BLS \(1977, 1980, 1984\)](#). Columns (1)–(6) report *log wages*; Columns (7)–(12) report *log employment*. All specifications include city and year fixed effects, nursing–category fixed effects, and the baseline controls used in Table 4. Standard errors are clustered at the state level. Observations for Columns (5)–(6) and (11)–(12) change because the OB/GYN clinical-specialist category is reported for a subset of metro areas. All regressions exclude states with third-party payment mandates. Clinical specialists follow BLS definitions and include nurses with advanced training in *geriatrics, medical–surgical, obstetrics and gynecology (OB/GYN), pediatrics* ([BLS, 1984](#), pg. 152). We remove psychiatric and other related fields because they are inconsistently reported between years. Columns (1)–(4)/(7)–(10) include just the general specialist category. While Columns (5)–(6) focus on OB–GYN nurse specialists relative to the medical-surgical and pediatrics categories. Other categories of nurses included in all columns include directors of nursing, supervisors of nurses, head nurses, nurse anesthetists, general duty nurses, and nursing instructors. BLS describes these specialist roles as normally requiring formal training beyond that required of registered professional nurses, often including a master’s degree in nursing science ([BLS, 1984](#), pg. 152).

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Online Appendix

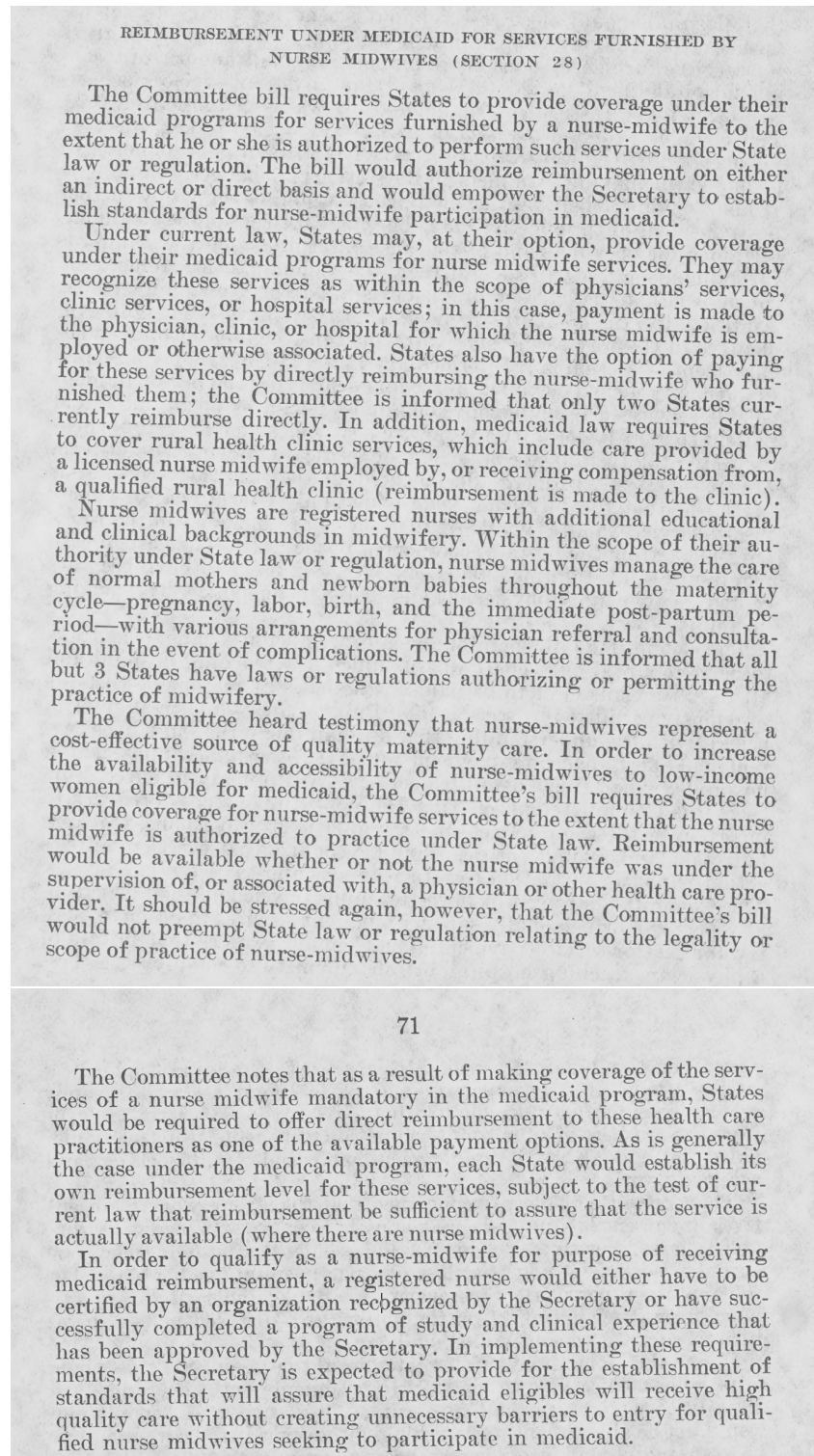
A Appendix–Background, Data, Empirical Strategy

Figure A.1: H.R.7765 - Omnibus Reconciliation Act of 1980

REIMBURSEMENT UNDER MEDICAID FOR SERVICES FURNISHED BY NURSE-MIDWIVES		94 STAT. 2652	PUBLIC LAW 96-499—DEC. 5, 1980
Sec. 965. (a)(1) Subsection (a) of section 1905 of the Social Security Act is amended—	42 USC 1396d.	42 USC 1396a.	by an organization recognized by the Secretary, and performs services in the area of management of the care of mothers and babies (throughout the maternity cycle) which he is legally authorized to perform in the State in which he performs such services.”.
(A) by striking out “and” at the end of paragraph (16);			(b) Section 1902(a) of such Act is amended—
(B) by redesignating paragraph (17) as paragraph (18); and			(1) by striking out “clauses (1) through (5)” in paragraph (13)(B) and inserting in lieu thereof “paragraphs (1) through (5) and (17)”;
(C) by inserting after paragraph (16) the following new paragraph:			(2) by striking out “clauses (1) through (5)” in paragraph (13)(C)(i) and inserting in lieu thereof “paragraphs (1) through (5) and (17)”;
“(17) services furnished by a nurse-midwife (as defined in subsection (m)) which he is legally authorized to perform under State law (or the State regulatory mechanism provided by State law), whether or not he is under the supervision of, or associated with, a physician or other health care provider; and”.			(3) by striking out “clauses numbered (1) through (16)” in paragraph (13)(C)(ii) and inserting in lieu thereof “paragraphs numbered (1) through (17)”;
(2) Such section is further amended by adding at the end thereof the following new subsection:	42 USC 1396a note.	42 USC 1396.	(4) by striking out “clauses (1) through (5) and (7)” in paragraph (14)(A)(i) and inserting in lieu thereof “paragraphs (1) through (5), (7), and (17)”.
“(m) The term ‘nurse-midwife’ means a registered nurse who has successfully completed a program of study and clinical experience meeting guidelines prescribed by the Secretary, or has been certified	“Nurse-midwife.”		(c)(1) The amendments made by this section shall (except as provided under paragraph (2)) be effective with respect to payments under title XIX of the Social Security Act for calendar quarters beginning more than one hundred and twenty days after the date of the enactment of this Act.
			(2) In the case of a State plan for medical assistance under title XIX of the Social Security Act which the Secretary of Health and Human Services determines requires State legislation in order for the plan to meet the additional requirements imposed by the amendments made by this section, the State plan shall not be regarded as failing to comply with the requirements of such title solely on the basis of its failure to meet these additional requirements before the first day of the first calendar quarter beginning after the close of the first regular session of the State legislature that begins after the date of the enactment of this Act.

SOURCE: H.R.7765 - Omnibus Reconciliation Act of 1980. Amendment to reimburse CNMs under Medicaid. Signed into law on 12/5/1980.

Figure A.2: House Committee - Pre-dating the Passage of the Omnibus Reconciliation Act of 1980



SOURCE: House Report 96-589, part 2. Medicare and Medicaid Amendments of 1980. HR4000. Committee on Interstate and Foreign Commerce. p 70-71.

Figure A.3: Births by Provider Type, 1989

NATALITY DOCUMENTATION TABLE 5.
LIVE BIRTHS BY ATTENDANT, PLACE OF DELIVERY AND RACE OF MOTHER: UNITED STATES, 1989
(RESIDENT BIRTHS ONLY, EXCLUDES BIRTHS TO NONRESIDENTS OF UNITED STATES)

PLACE OF DELIVERY AND RACE OF MOTHER	ALL BIRTHS	ATTENDANT							OTHER	NOT STATED
		PHYSICIAN			MIDWIFE					
		TOTAL	DOCTOR OF MEDICINE	DOCTOR OF OSTEOPTHY	TOTAL	CERTIFIED NURSE MIDWIFE	OTHER MIDWIFE			
ALL RACES ^{1/}	4,040,958	3,856,842	3,742,315	114,527	147,293	132,286	15,007	26,737	10,086	
IN HOSPITAL	3,991,448	3,842,313	3,729,345	112,968	125,451	122,892	2,559	14,983	8,701	
NOT IN HOSPITAL	47,214	12,970	11,450	1,520	21,766	9,366	12,400	11,707	771	
FREESTANDING BIRTHING CENTER.....	14,273	5,016	4,388	628	8,990	5,678	3,312	235	32	
CLINIC / DOCTOR'S OFFICE.....	1,111	769	553	216	173	107	66	168	1	
RESIDENCE	27,748	5,790	5,170	620	11,383	3,412	7,971	9,919	656	
OTHER	4,082	1,395	1,339	56	1,220	169	1,051	1,385	82	
NOT STATED	2,296	1,559	1,520	39	76	28	48	47	614	
WHITE.....	3,192,355	3,055,680	2,959,315	96,365	111,543	97,921	13,622	18,941	6,191	
IN HOSPITAL	3,150,804	3,044,933	2,949,993	94,940	90,612	89,067	1,545	10,092	5,167	
NOT IN HOSPITAL	39,566	9,346	7,952	1,394	20,860	8,828	12,032	8,819	541	
FREESTANDING BIRTHING CENTER.....	13,432	4,520	3,934	586	8,658	5,404	3,254	223	31	
CLINIC / DOCTOR'S OFFICE.....	890	646	436	210	154	99	55	90	-	
RESIDENCE	22,443	3,437	2,883	554	10,883	3,181	7,702	7,664	459	
OTHER	2,801	743	699	44	1,165	144	1,021	842	51	
NOT STATED	1,985	1,401	1,370	31	71	26	45	30	483	
BLACK.....	673,124	636,536	622,168	14,368	26,776	25,711	1,065	6,492	3,320	
IN HOSPITAL	666,968	633,315	619,043	14,272	26,285	25,381	904	4,312	3,056	
NOT IN HOSPITAL	5,890	3,085	2,994	91	489	329	160	2,164	152	
FREESTANDING BIRTHING CENTER.....	541	355	321	34	180	162	18	5	1	
CLINIC / DOCTOR'S OFFICE.....	113	64	63	1	9	4	5	39	1	
RESIDENCE	4,189	2,104	2,054	50	265	144	121	1,691	129	
OTHER	1,047	562	556	6	35	19	16	429	21	
NOT STATED	266	136	131	5	2	1	1	16	112	

^{1/} INCLUDES RACES OTHER THAN WHITE AND BLACK.

SOURCE: NCHS (1992), see <https://data.nber.org/nvss/natality/inputs/pdf/1989/Nat1989doc.pdf>.

Figure A.4: U.S. Standard Certificate of Live Birth in 1978

Form Approved
OMB No. 68R 1900

U.S. STANDARD
CERTIFICATE OF LIVE BIRTH

TYPE OR PRINT IN PERMANENT INK FOR INSTRUCTIONS SEE HANDBOOK

LOCAL FILE NUMBER

BIRTH NUMBER

CHILD-NAME FIRST MIDDLE LAST SEX DATE OF BIRTH (Mo. Day, Yr.) HOUR

1. CHILD HOSPITAL-NAME (If not in hospital give street and number) CITY, TOWN OR LOCATION OF BIRTH COUNTY OF BIRTH

4a. I certify that the stated information concerning this child is true to the best of my knowledge and belief DATE SIGNED (Mo., Day, Yr.) NAME AND TITLE OF ATTENDANT AT BIRTH IF OTHER THAN CERTIFIER (Type or print)

5a. (Signature) CERTIFIER-NAME AND TITLE (Type or print) MAILING ADDRESS (Street or R.F.D. No. City or Town, State, Zip)

5d. REGISTRAR DATE RECEIVED BY REGISTRAR (Month, Day, Year)

6a. (Signature) MOTHER-MAIDEN NAME FIRST MIDDLE LAST AGE (At time of this birth) STATE OF BIRTH (If not in U.S.A. name country)

7a. RESIDENCE-STATE COUNTY CITY, TOWN OR LOCATION STREET AND NUMBER OF RESIDENCE INSIDE CITY LIMITS (Specify yes or no)

8a. MOTHER'S MAILING ADDRESS-If same as above enter Zip Code only

9. FATHER-NAME FIRST MIDDLE LAST AGE (At time of this birth) STATE OF BIRTH (If not in U.S.A. name country)

10a. I certify that the personal information provided on this certificate is correct to the best of my knowledge and belief (Signature of Parent or other Informant) RELATION TO CHILD

11a. INFORMATION FOR MEDICAL AND HEALTH USE ONLY

12. RACE-MOTHER (e.g., White, Black, American Indian, etc.) (Specify) 13. RACE-FATHER (e.g., White, Black, American Indian, etc.) (Specify) 14. BIRTH WEIGHT 15a. THIS BIRTH-Single, twin, triplet, etc. (Specify) 15b. IF NOT SINGLE BIRTH-Born first, second, third, etc. (Specify) 16. IS MOTHER MARRIED? (Specify yes or no)

17a. LIVE BIRTHS (Do not include this child) 17b. NOW DEAD 17c. NOW DEAD 17d. BEFORE 20 WEEKS 17e. AFTER 20 WEEKS 18. DATE LAST NORMAL MENSTRUATION BEGAN (Month, Day, Year) 19. MONTH OF PREGNANCY PRENATAL CARE BEGAN First, second, etc. (Specify) 20. PRENATAL VISITS Total number (If none so state) 21a. 21b. 22a. 22b. 23. APGAR SCORE 1 min 5 min

24. COMPLICATIONS OF PREGNANCY (Describe or write none) 25. CONCURRENT ILLNESSES OR CONDITIONS AFFECTING THE PREGNANCY (Describe or write none) 26. CONGENITAL MALFORMATIONS OR ANOMALIES OF CHILD (Describe or write none)

27. COMPLICATIONS OF LABOR AND/OR DELIVERY (Describe or write none)

DEATH UNDER ONE YEAR OF AGE Enter State File Number of death certificate for this child

MULTIPLE BIRTHS Enter State File Number for (males)

LIVE BIRTH(S)

FETAL DEATH(S)

HRA-161 Rev. 1/78

SOURCE: U.S. Certificate of Live Birth, 1978. Recent 2003 version available here <https://www.cdc.gov/nchs/data/dvs/birth11-03final-ACC.pdf>

Figure A.5: U.S. Standard Certificate of Live Birth in 1989

OFFICE of VITAL STATISTICS												
U.S. STANDARD CERTIFICATE OF LIVE BIRTH		BIRTH NUMBER										
1. CHILD'S NAME (First, Middle, Last)		2. DATE OF BIRTH (Month, Day, Year)	3. TIME OF BIRTH									
4. SEX	5. CITY, TOWN, OR LOCATION OF BIRTH	6. COUNTY OF BIRTH										
7. PLACE OF BIRTH: ☐ Hospital ☐ Freestanding Birthing Center ☐ Clinic/Doctor's Office ☐ Residence ☐ Other (Specify)		8. FACILITY NAME (If not institution, give street and number)										
9. I certify that this child was born alive at the place and time and on the date stated.		10. DATE SIGNED (Month, Day, Year)	11. ATTENDANT'S NAME AND TITLE (If other than certifier) (Type/Print) Name _____ ☐ M.D. ☐ D.O. ☐ C.N.M. ☐ Other Midwife ☐ Other (Specify)									
12. CERTIFIER'S NAME AND TITLE (Type/Print) Name _____ ☐ M.D. ☐ D.O. ☐ Hospital Admin. ☐ C.N.M. ☐ Other Midwife ☐ Other (Specify)		13. ATTENDANT'S MAILING ADDRESS (Street and Number or Rural Route Number, City or Town, State, Zip Code)										
14. REGISTRAR'S SIGNATURE		15. DATE FILED BY REGISTRAR (Month, Day, Year)										
16a. MOTHER'S NAME (First, Middle, Last)		16b. MAIDEN SURNAME	17. DATE OF BIRTH (Month, Day, Year)									
18. BIRTHPLACE (State or Foreign Country)	19a. RESIDENCE—STATE	19b. COUNTY	19c. CITY, TOWN, OR LOCATION									
19d. STREET AND NUMBER	19e. INSIDE CITY LIMITS? (Yes or no)	20. MOTHER'S MAILING ADDRESS (If same as residence, enter Zip Code on 19c)										
21. FATHER'S NAME (First, Middle, Last)		22. DATE OF BIRTH (Month, Day, Year)	23. BIRTHPLACE (State or Foreign Country)									
24. I certify that the personal information provided on this certificate is correct to the best of my knowledge and belief. Signature of Parent or Other Informant												
INFORMATION FOR MEDICAL AND HEALTH USE ONLY												
25. OF HISPANIC ORIGIN? (Specify No or Yes—If yes, specify Cuban, Mexican, Puerto Rican, etc.)		26. RACE—American Indian, Black, White, etc. (Specify below)										
27a. ☐ No ☐ Yes Specify:		27b. ☐ No ☐ Yes Specify:										
28. PREGNANCY HISTORY (Complete each section)		29. MOTHER MARRIED? (At birth, conception, or any time between) (Yes or no)										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">LIVE BIRTHS (Do not include this child)</th> <th>OTHER TERMINATIONS (Spontaneous and induced at any time after conception)</th> </tr> <tr> <td>28a. Now Living Number _____ ☐ None</td> <td>28b. Now Dead Number _____ ☐ None</td> <td>28c. _____ Number _____ ☐ None</td> </tr> <tr> <td colspan="2">28d. DATE OF LAST LIVE BIRTH (Month, Year)</td> <td>28e. DATE OF LAST OTHER TERMINATION (Month, Year)</td> </tr> </table>		LIVE BIRTHS (Do not include this child)		OTHER TERMINATIONS (Spontaneous and induced at any time after conception)	28a. Now Living Number _____ ☐ None	28b. Now Dead Number _____ ☐ None	28c. _____ Number _____ ☐ None	28d. DATE OF LAST LIVE BIRTH (Month, Year)		28e. DATE OF LAST OTHER TERMINATION (Month, Year)	30. DATE LAST NORMAL MENSES BEGAN (Month, Day, Year)	
LIVE BIRTHS (Do not include this child)		OTHER TERMINATIONS (Spontaneous and induced at any time after conception)										
28a. Now Living Number _____ ☐ None	28b. Now Dead Number _____ ☐ None	28c. _____ Number _____ ☐ None										
28d. DATE OF LAST LIVE BIRTH (Month, Year)		28e. DATE OF LAST OTHER TERMINATION (Month, Year)										
31. MONTH OF PREGNANCY PRENATAL CARE BEGAN—First, Second, Third, etc. (Specify)		32. PRENATAL VISITS—Total Number (If none, so state)										
33. BIRTH WEIGHT (Specify unit)		34. CLINICAL ESTIMATE OF GESTATION (Week)										
35a. PLURALITY—Single, Twin, Triplet, etc. (Specify)		35b. IF NOT SINGLE BIRTH—Born First, Second, Third, etc. (Specify)										
36. APGAR SCORE		37a. MOTHER TRANSFERRED PRIOR TO DELIVERY? ☐ No ☐ Yes. If Yes, enter name of facility transferred from:										
36a. 1 Minute	36b. 5 Minutes	37b. INFANT TRANSFERRED? ☐ No ☐ Yes. If Yes, enter name of facility transferred to:										



John Hancock
State Registrar

THE ABOVE SIGNATURE CERTIFIES THAT THIS IS A TRUE AND CORRECT COPY OF THE OFFICIAL RECORD ON FILE IN THIS OFFICE.
THIS DOCUMENT IS PRINTED OR PHOTOCOPIED ON SECURITY PAPER WITH A WATERMARK.

WARNING:

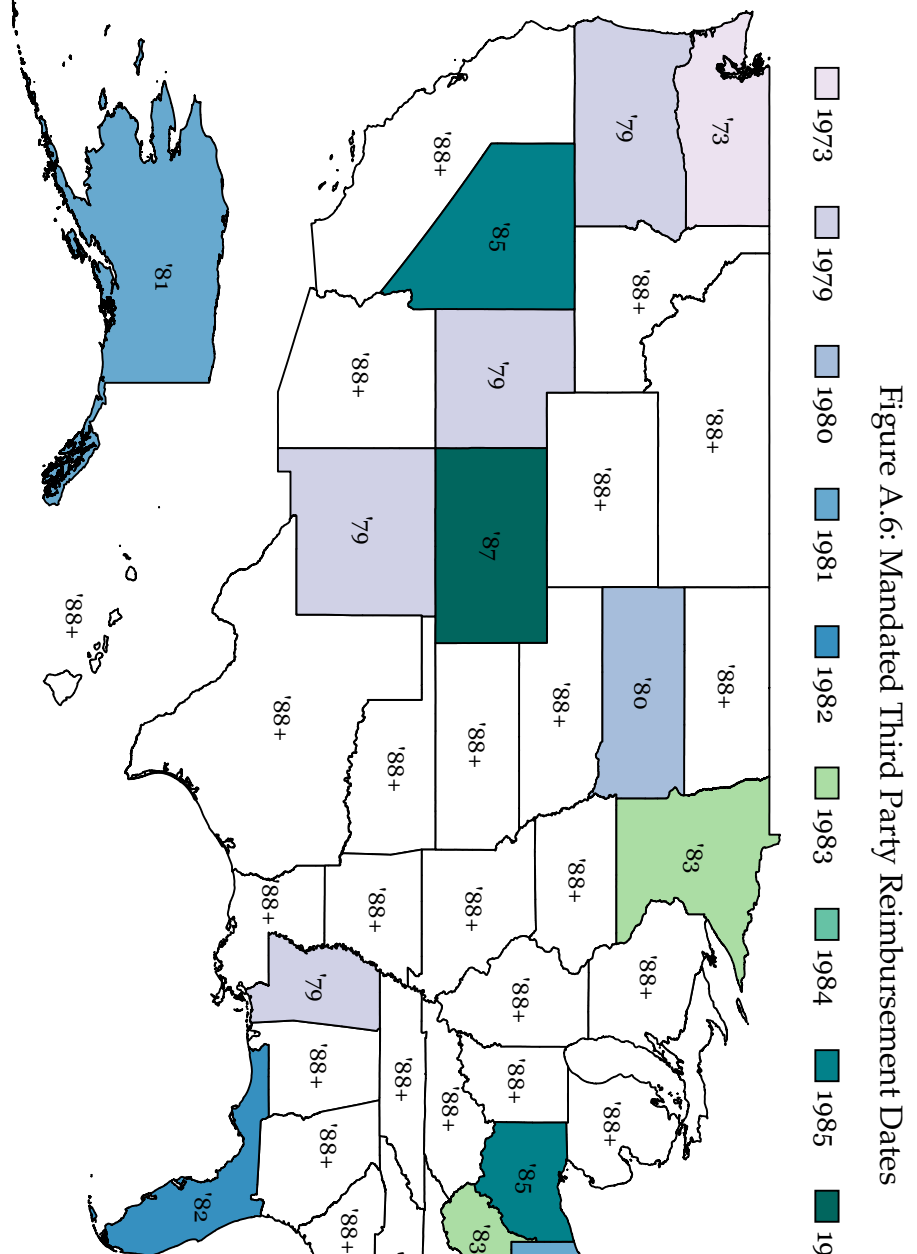
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CERTIFICATION OF VITAL RECORD





SOURCE: U.S. Certificate of Life Birth, 1989. Recent 2003 version available here <https://www.cdc.gov/nchs/data/dvs/birth11-03final-ACC.pdf>

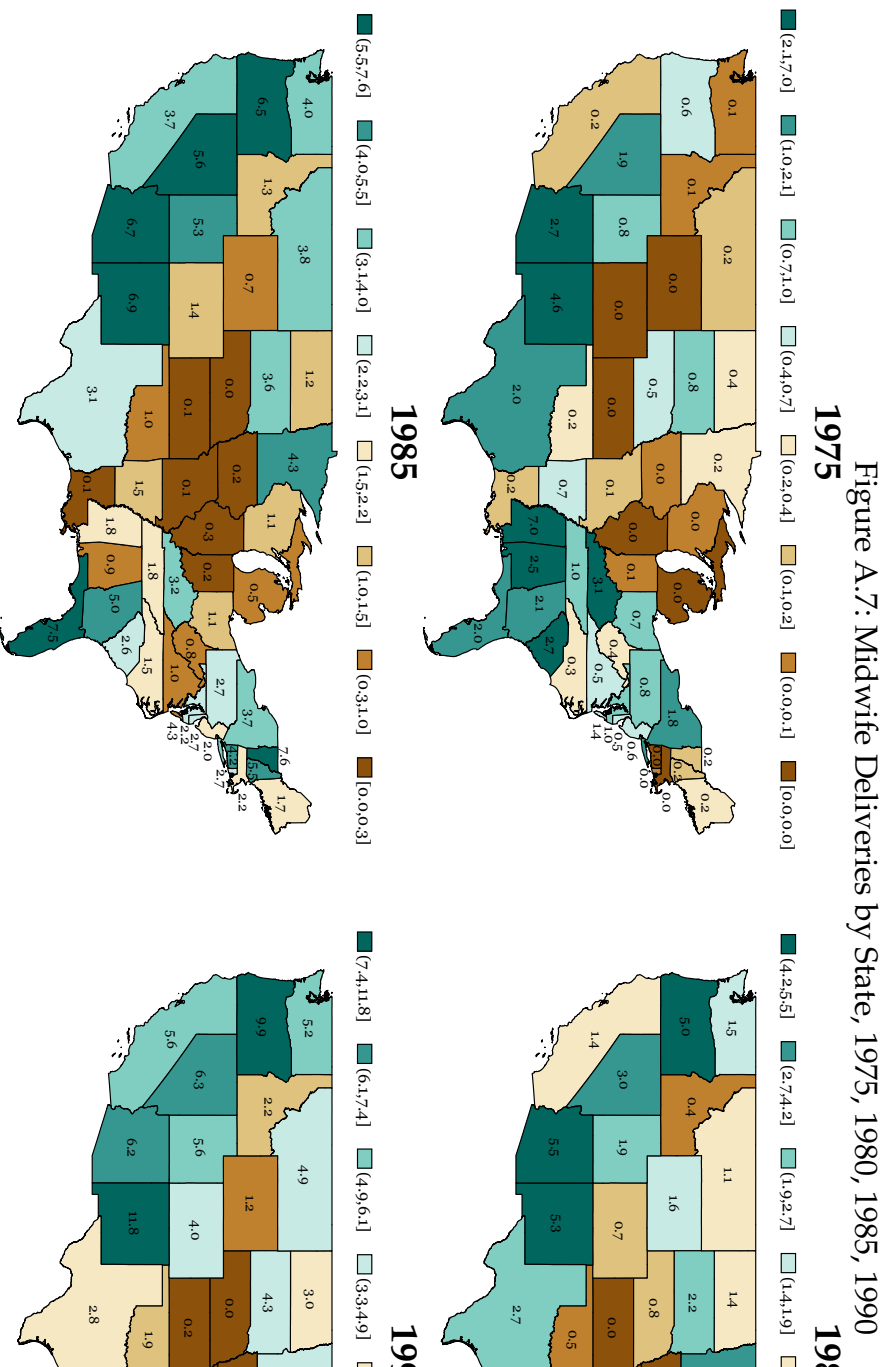


SOURCE: Miller (2006).

Table A.1: Years of Medicaid Reimbursement and Third Party Payments

	(1)	(2)
State	Medicaid Reimbursement	Third Party Reimbursement
AK	1981	1981
AL	.	2005
AR	1983	.
AZ	.	1991
CA	1980	1991
CO	1980	1987
CT	.	1984
DC	.	.
DE	1980	1992
FL	1980	1982
GA	1982	.
HI	1980	1999
IA	.	1996
ID	1980	.
IL	.	.
IN	.	.
KS	.	1990
KY	1980	.
LA	1985	2006
MA	1980	1985
MD	1980	1979
ME	1983	1999
MI	1984	.
MN	1983	1983
MO	.	1998
MS	1980	1979
MT	1980	1993
NC	.	1993
ND	.	1995
NE	.	.
NH	1980	1985
NJ	1980	1982
NM	1980	1979
NV	.	1985
NY	1984	1983
OH	1983	1985
OK	1985	.
OR	1980	1979
PA	1982	1981
RI	1980	1991
SC	1980	.
SD	.	1980
TN	1989	1994
TX	.	.
UT	1980	1979
VA	1985	1997
VT	1980	.
WA	1980	1973
WI	1985	.
WV	1980	1983
WY	.	.

Note: Main sample excludes states passing third-party reimbursements during the study period. By 1994 all states were compliant with the federal Medicaid mandate, but specific dates after 1987 are not available, except TN.



SOURCE: Vital Statistics Natality Birth Data (Birth Certificate Records) from the National Vital Statistics System of the National Center for Health Statistics.

NOTE: Maps represent the percent of deliveries to midwives in each state.

Table A.2: Empirical Strategy—Do Midwife Deliveries Predict Adoption of the Reimbursement Mandate?

Panel A: Cox Proportional Hazard, Adoption of Medicaid Reimbursement						
	National Adoption			Staggered Adoption		
	(1)	(2)	(3)	(4)	(5)	(6)
L1.Midwife	7.2460 (16.5317)	15.1280 (16.9042)	86.4481 (91.7167)	0.1577 (13.9019)	11.5666 (16.1682)	-27.3079 (42.6157)
L2.Midwife			-169.5943 (159.6768)			89.0953* (48.3321)
L3.Midwife			90.0633 (99.7195)			-17.0824 (43.4769)
L4.Midwife			38.1188 (117.3238)			-42.7366 (34.5880)
N	246	246	159	356	356	257
Pseudo R-squared	0.001	0.104	0.113	0.000	0.104	0.113

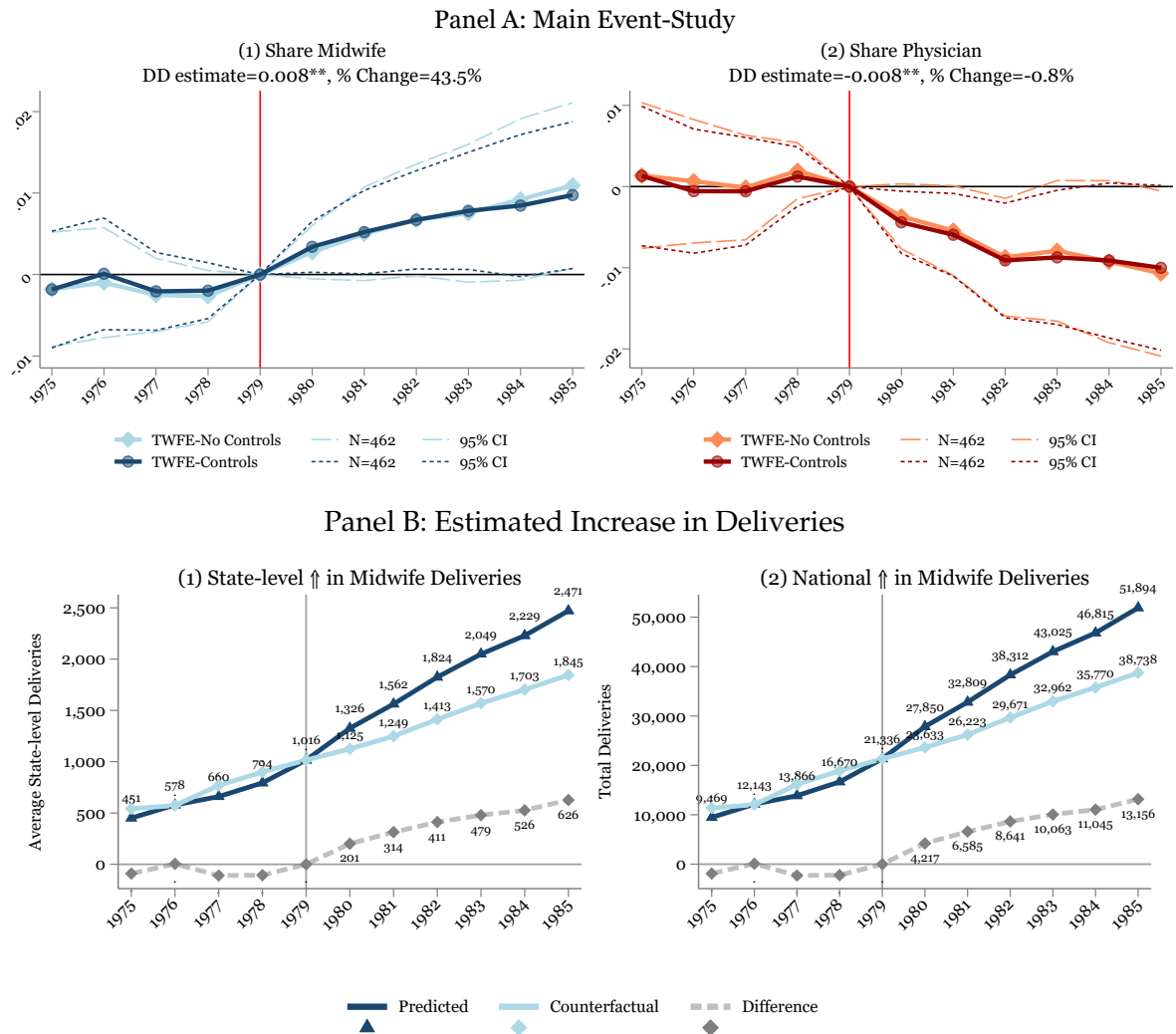
Panel B: OLS, Adoption of Medicaid Reimbursement						
	National Adoption			Staggered Adoption		
	(1)	(2)	(3)	(4)	(5)	(6)
L. Share Midwife	2.7770 (3.0936)	4.3099 (3.2492)	6.9905 (5.4078)	1.2845 (2.5065)	0.4377 (2.9801)	-0.8624 (3.1078)
L2. Share Midwife			3.3717 (3.6522)			2.9047 (3.5165)
L3. Share Midwife			-3.4186 (4.0672)			0.8199 (4.2447)
L4. Share Midwife			-0.1108 (3.3762)			-3.0079 (3.5971)
N	246	246	159	356	356	257
R-squared	0.462	0.476	0.577	0.307	0.338	0.414
State FE and Year FE	X	X	X	X	X	X
Controls		X	X		X	X

SOURCE: Vital Statistics Natality Birth Data (Birth Certificate Records) from the National Vital Statistics System of the National Center for Health Statistics.

NOTES: Results in Panel A from a Cox Proportional Hazard model. The ‘failure year’ is based on the year of the Medicaid reimbursement mandate. In Panel B, the outcome is the adoption of the reimbursement mandate, where we conclude the sample the year after the reimbursement mandate is adopted. Both Panels A and B test whether the share of midwife deliveries predicts the adoption timing of the reimbursement mandate. Controls include the average maternal age from the birth certificates, the state-level prenatal Medicaid eligibility and Medicaid expansions reported in [East et al. \(2023\)](#), the log of the number of physicians per 1,000 ([AHRF, 1994](#)), and the share of reproductive-age females with both a high school and college education ([Ruggles et al., 2021](#)).

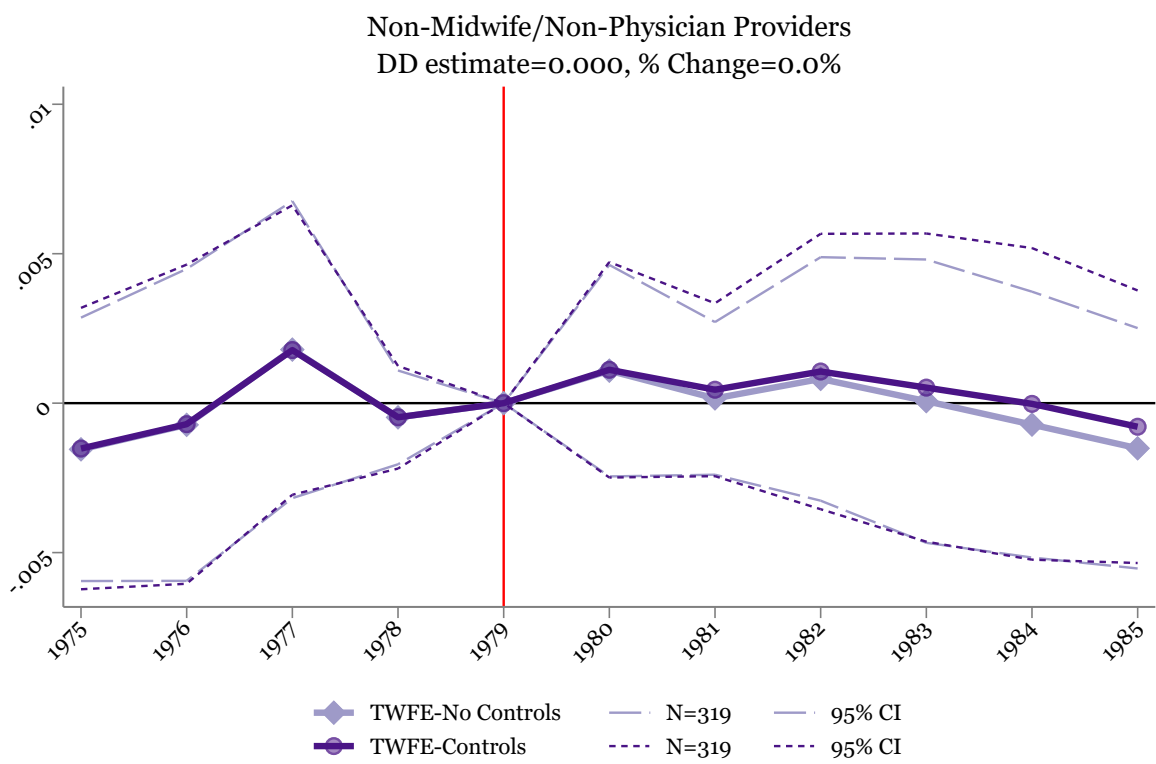
B Main Results and Robustness

Figure B.1: Main Results—Mandated CNM Medicaid Reimbursements and Midwife Deliveries, All States



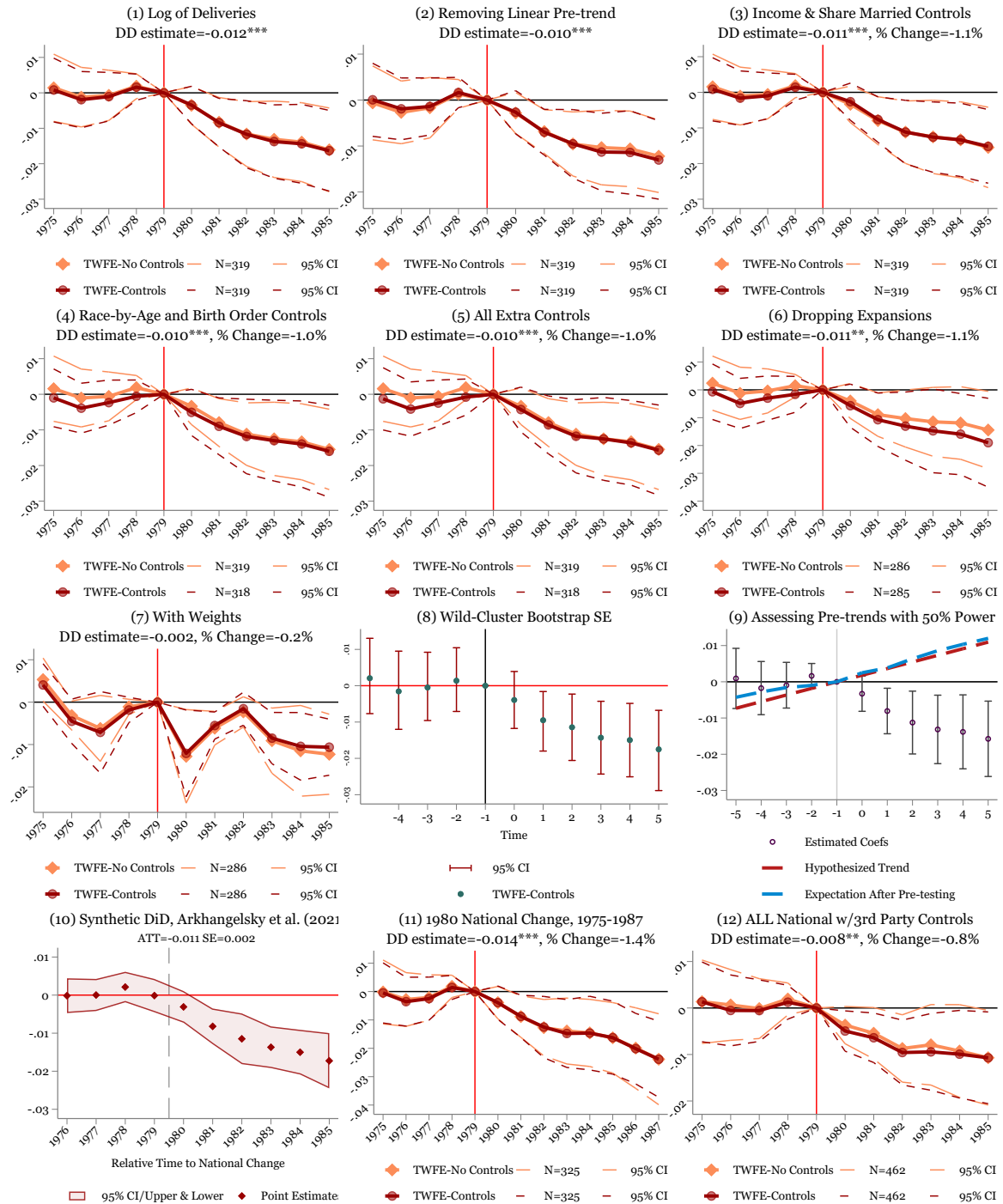
NOTES: Reflects Figure III, except including states that passed third-party payment mandates.

Figure B.2: Main Results–Share Other Provider Deliveries



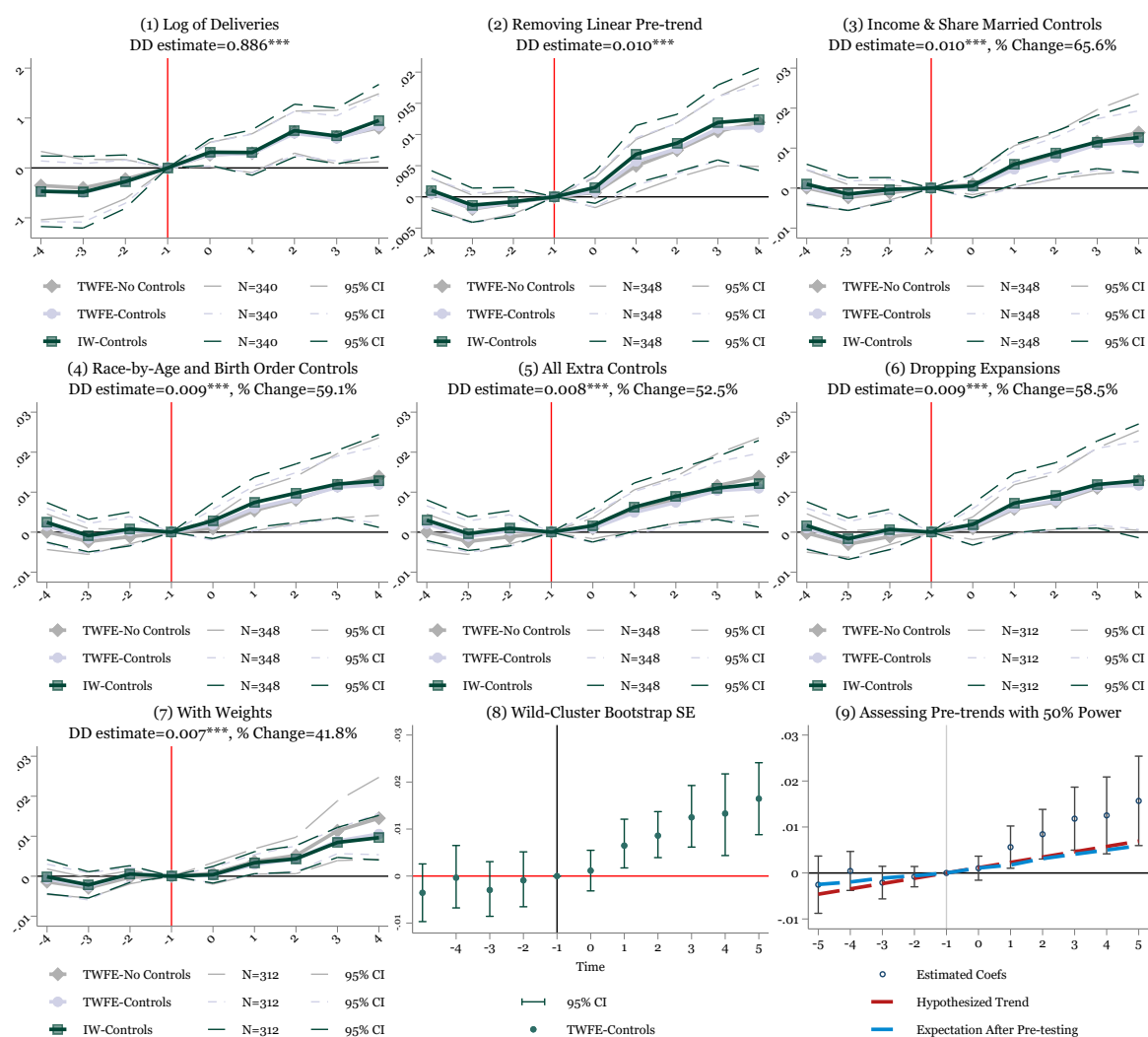
NOTES: Reflects Figure III, except showing non-physician, non-midwife providers.

Figure B.3: Robustness–Staggered Adoption of CNM Reimbursement Mandates and Share Physician Deliveries



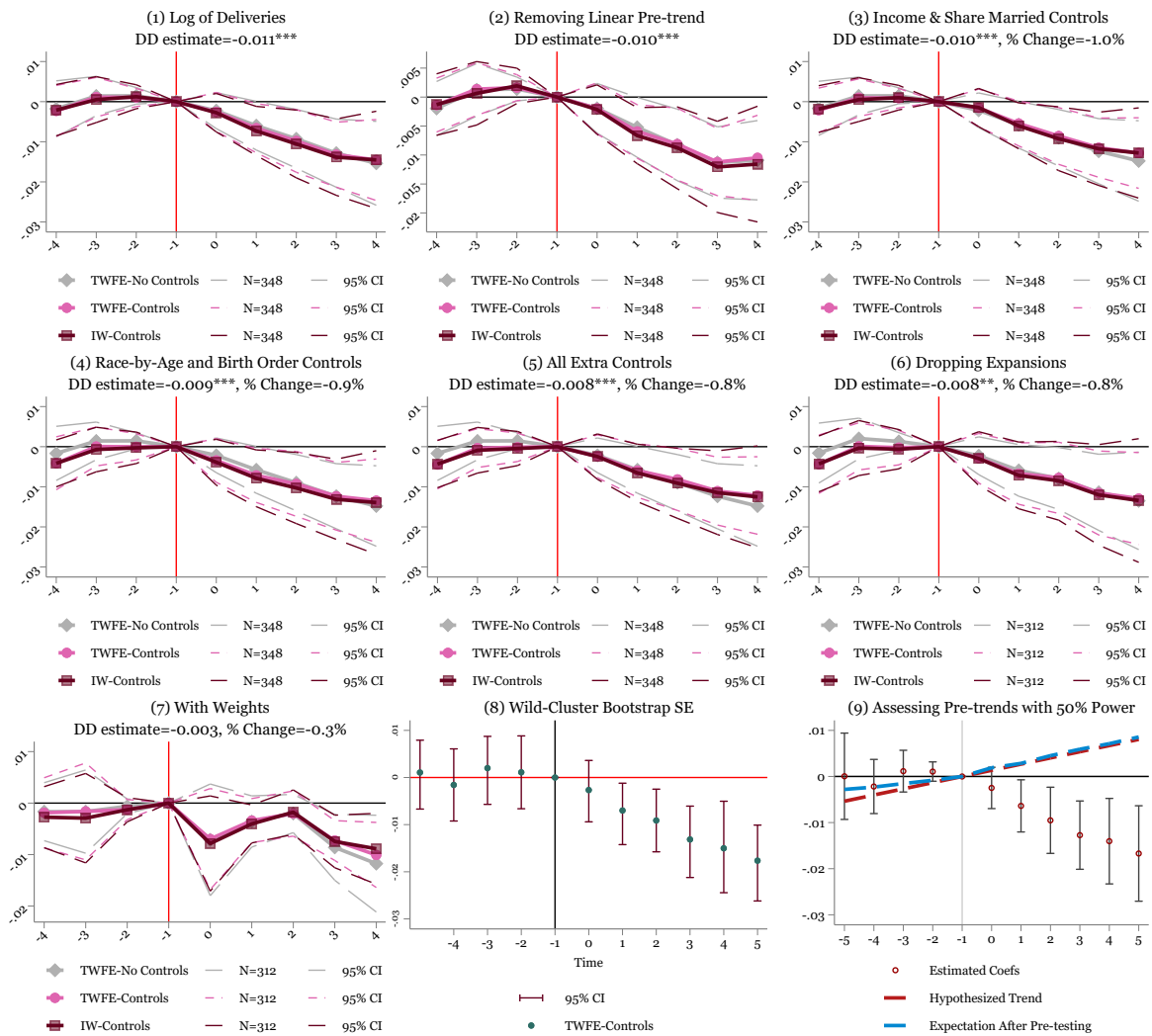
NOTES: Reflects Figure V except considering physician deliveries.

Figure B.4: Robustness–Staggered Adoption of CNM Reimbursement Mandates and Share Midwife Deliveries



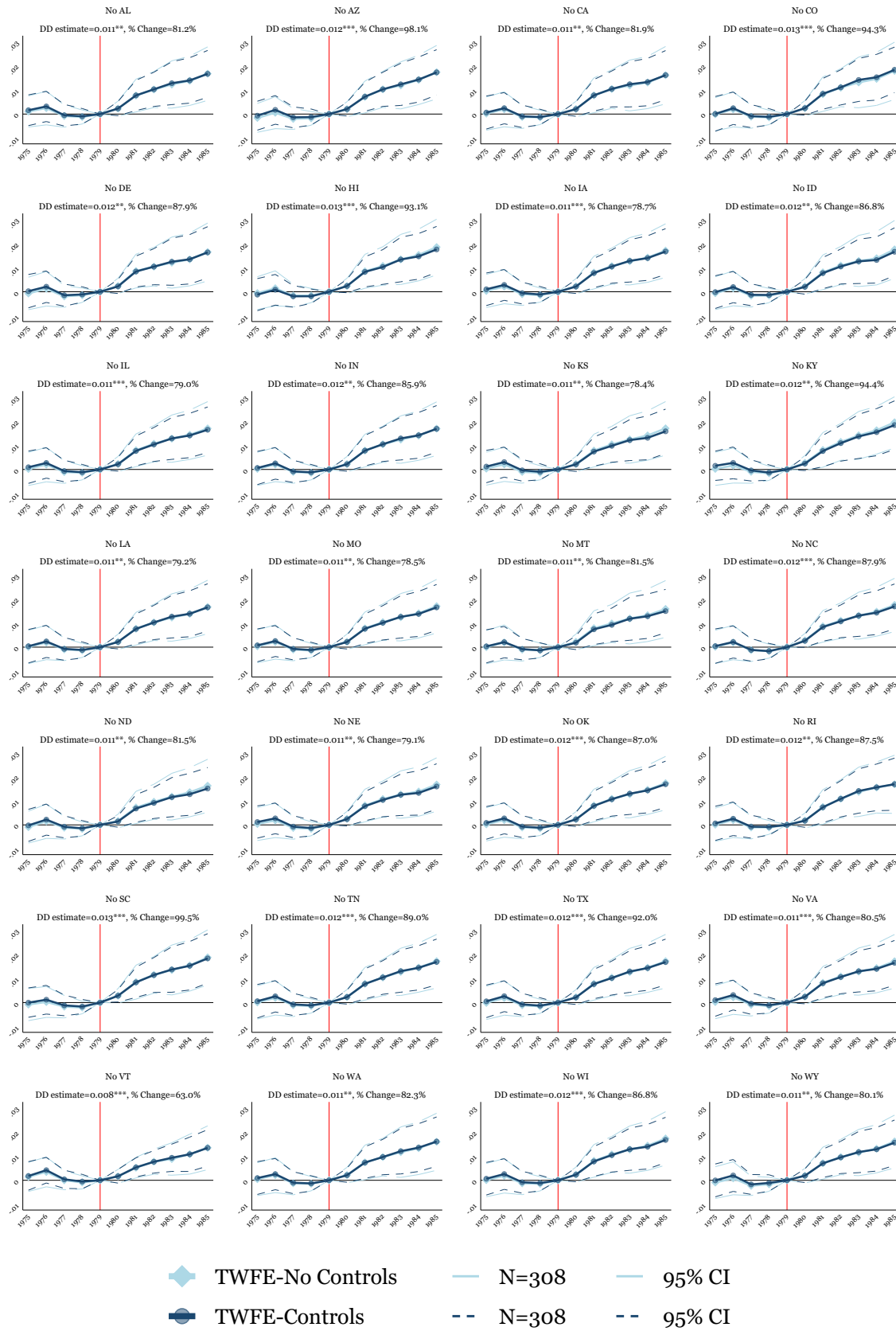
NOTES: Reflects Figure V panels (1)-(9), except including the staggered adoption of states in the sample. Years included are through 1986. The passage of medicaid reimbursements through 1985 considered.

Figure B.5: Robustness–Staggered Adoption of CNM Reimbursement Mandates and Share Physician Deliveries



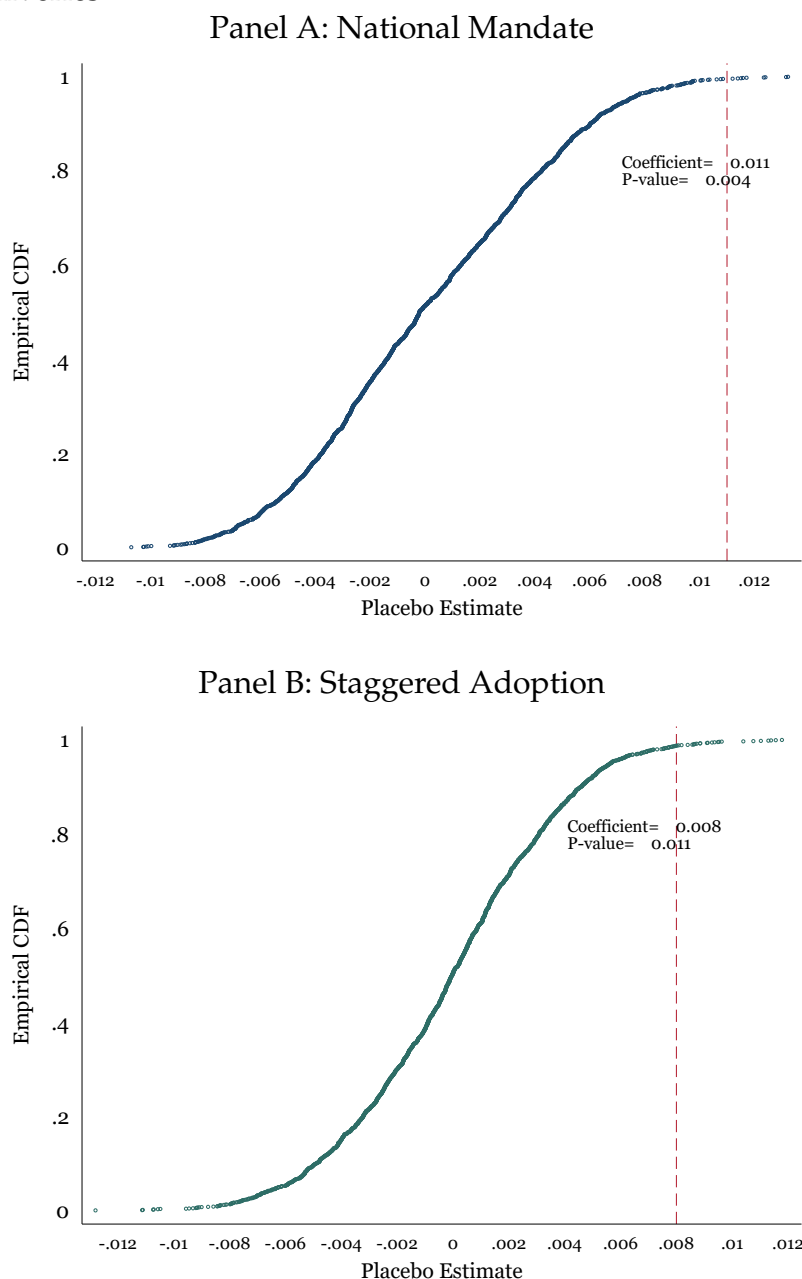
NOTES: Reflects Figure V panels (1)-(9), except including the staggered adoption of states in the sample and using the share of deliveries to physicians as the outcome. Years included are through 1986. The passage of medicaid reimbursements through 1985 considered.

Figure B.6: Federal Medicaid Reimbursement Mandate and Share Midwife Deliveries: Leave-one-out State-level Analysis



NOTES: Reflects Figure III, except omitting one state at a time from the analysis.

Figure B.7: Robustness–Placebo Test on Medicaid Reimbursements and Share Midwife Deliveries



NOTES: Actual point estimate reflects the main specification in Figure III. To perform the placebo test, we randomly assign the year of the Medicaid reimbursement across treated and control states. We assign the treatment timing in the same staggered treatment setup as the baseline but vary the states assigned to each year of treatment. The randomization of states across the staggered setup is performed 2,000 times. In each case, we choose a different set of placebo treatment states. The plotted CDF represents the distribution of estimates from these placebo simulations, with the estimated coefficient for our ‘actual’ difference-in-differences estimate indicated by the vertical line. The non-parametric p-value is calculated as the number of placebo observations that are greater than the estimated effect, divided by the sample size of all permutation estimates.

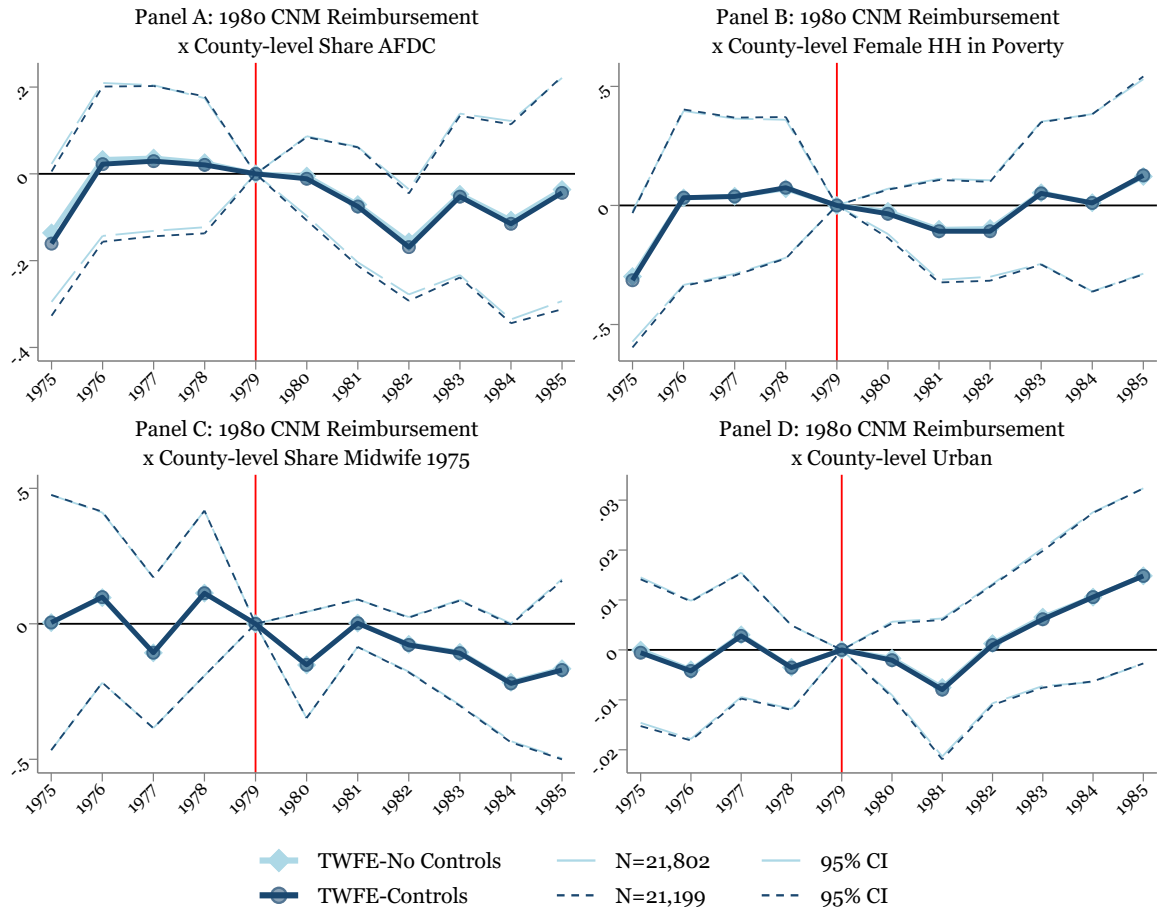
C Mechanisms

Table C.1: Mechanisms–Subsample Analysis–Federal Mandate and Share Midwife Deliveries

Outcome: Share Midwife Deliveries									
Panel A: Basic Subsamples									
	Race		Marital		Birth Order				
	(1) White	(2) Non- White	(3) Married	(4) Single	(5) 1	(6) 2	(7) 3	(8) 4	(9) 5
1(Federal Mandate)	0.0129*** (0.0039)	0.0108 (0.0064)	0.0100*** (0.0035)	0.0052* (0.0030)	0.0096** (0.0036)	0.0115*** (0.0038)	0.0127*** (0.0045)	0.0135** (0.0050)	0.0130** (0.0049)
N	319	319	300	300	318	318	318	318	318
Adjusted R-squared	0.795	0.811	0.834	0.842	0.804	0.805	0.775	0.788	0.789
Mean Dependent	0.013	0.018	0.014	0.014	0.012	0.013	0.014	0.016	0.019
Panel B: Combination Race/Married/Parity Subsamples									
	All	Single				Married			
	(1) Group x Year FE	(2) White 1st Delivery	(3) White 2+ Deliveries	(4) Nonwhite 1st Delivery	(5) Nonwhite 2+ Deliveries	(6) White 1st Delivery	(7) White 2+ Deliveries	(8) Nonwhite 1st Delivery	(9) Nonwhite 2+ Deliveries
1(Federal Mandate)=1	0.0074** (0.0029)	0.0063*** (0.0017)	0.0078*** (0.0020)	0.0015 (0.0042)	-0.0024 (0.0054)	0.0051** (0.0020)	0.0074** (0.0031)	-0.0020 (0.0034)	-0.0005 (0.0028)
N	1,196	299	299	299	299	299	299	299	298
Adjusted R-squared	0.727	0.893	0.923	0.865	0.867	0.861	0.911	0.879	0.861
Mean Dependent	0.022	0.012	0.015	0.012	0.015	0.014	0.014	0.014	0.014
Panel C: Birth Order Subsamples									
	All	Single				Married			
	(1) Group x Year FE	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		2	3	4	5+	2	3	4	5+
1(Federal Mandate)=1	0.0107** (0.0045)	0.0067** (0.0032)	0.0050 (0.0032)	0.0103* (0.0058)	0.0095** (0.0042)	0.0097*** (0.0034)	0.0111** (0.0040)	0.0114** (0.0046)	0.0111** (0.0050)
Observations	3,580	299	299	299	299	299	299	299	299
Adjusted R-squared	0.354	0.810	0.740	0.714	0.692	0.822	0.795	0.794	0.788
Mean Dependent	0.021	0.014	0.014	0.014	0.015	0.013	0.015	0.017	0.021
Year and State FE	X	X	X	X	X	X	X	X	X
Controls	X	X	X	X	X	X	X	X	X

NOTES: Reflects state-level grouped post-period from Figure III. The presented results exclude third-party payment states.

Figure C.1: Mechanisms– 1980 Federal Mandate x County-level Factors



NOTES: Reflects Figure III except considering the effect of the Medicaid reimbursement mandate by the share of each county-level characteristic. We include state-by-year fixed effects to consider the within-state effect, and also include the variable of interest interacted with the year. County and year fixed effects are also included, and standard errors are clustered at the county level (because the variation in treatment is at the county level).