

A Tale of Two Cities? The Heterogeneous Impact of Medicaid Managed Care in Kentucky

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Does managed care produce lower health care utilization and costs through better aligned financial incentives and alternative delivery methods (the “pure HMO” effect) or by attracting more healthy enrollees (plan endogeneity)? The purpose of this paper is to shed new light on this fundamental question using a quasi-experimental approach that exploits the timing and county specific implementation of Medicaid managed care plans in two distinct sub-sets of Kentucky counties in the late 1990s. We find large differences in the relative success of each region in reducing utilization that are likely driven by important differences in plan design. (97 words)

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I. Introduction

Managed care health insurance plans, such as Health Maintenance Organizations (HMOs), are generally thought of as a lower cost alternative to traditional Fee-For-Service (FFS) plans. In theory, managed care plans are able to reduce utilization and costs through a variety of mechanisms. One such mechanism is the capitation of fees paid to providers. Managed care plans often pay providers a lump sum per patient that does not vary based on the services provided to the patient. Thus, unlike with a FFS plan, under managed care the marginal revenue a physician receives from the provision of an additional service is zero. Capitated fees therefore create incentives for physicians to reduce utilization. Other features of managed care plans that may result in reduced utilization and costs include restricting enrollees to a specific list of covered providers, the use of primary care “gate-keeper” physicians that must provide prior authorization for specialist visits, careful monitoring of physician resource utilization, and the promotion of preventative care. These features are supposed to help ensure enrollees are receiving the appropriate level of care in the appropriate setting.¹

How popular are managed care plans? According to Glied (2000), over 70 percent of all Americans with health insurance were enrolled in some form of managed care by 1993. Policymakers have taken a particular interest in the possibility that managed care can lead to reductions in utilization and costs.² The Balanced Budget Act (BBA) of 1997 permitted new forms of managed care plans to participate in Medicare and also gave states the broad authority

¹ Various aspects of literature on managed care are reviewed in Glied (2000), Luft (1981), and Cutler and Zeckhauser (2000).

² Marton (2007) examines the enrollment impact of changes in SCHIP premiums, another potential tool to reduce costs. The Deficit Reduction Act of 2005 gives states more latitude to introduce premiums into their Medicaid programs. Marton and Wildasin (2007) provides an overview of Medicaid expenditures and state budgets.

to mandate enrollment in Medicaid managed care plans without obtaining a federal waiver.³

According to the Kaiser Family Foundation (2001), over half of all Medicaid beneficiaries were enrolled in a managed care plan in 2000. Despite the growth in the popularity of managed care plans, there remains very little convincing evidence on the impact of such plans on the utilization of health care services, health care costs, and health outcomes.

Many researchers have pointed out that simply comparing the utilization of managed care enrollees with the utilization of FFS enrollees may not be informative due to the ability of enrollees in many circumstances to choose their health plan. The observation that managed care plans have lower costs than FFS plans could be explained by managed care plans disproportionately enrolling lower utilization / lower cost customers. Therefore a question that has persistently plagued both researchers and policymakers alike is whether HMOs and other forms of managed care produce lower health care utilization through better aligned financial incentives and alternative delivery methods (the pure HMO effect) or by attracting more healthy enrollees (plan endogeneity).

The purpose of our paper is to shed new light on this question of the “pure” HMO effect versus “plan endogeneity” using a quasi-experimental approach that exploits the timing and county specific implementation of Medicaid managed care mandates in Kentucky in the late 1990s. The Medicaid program in Kentucky was changed from a FFS system to a managed care system in two geographically distinct sub-sets of counties, so we can compare recipients initially in each of the two sets of “treatment” counties before and after this reform with recipients initially in neighboring “control” counties that remained in a FFS system in order to assess the

³ For more discussion of Medicare managed care, see Kaiser Family Foundation (2007) Fact Sheet “Medicare Advantage” and for more discussion of Medicaid managed care, See Kaiser Family Foundation (2001) Fact Sheet “Medicaid and Managed Care”.

impact of Medicaid managed care on child health care utilization (i.e. changes along the intensive margin).

Having two distinct treatment regions built around the two largest cities in the state (Louisville and Lexington) is one unique aspect of this reform. Differences in the managed care plans established in each region motivate our heterogeneous treatment effect approach of modeling the impact of each plan separately. The Louisville-centered plan (Passport) elected to reimburse physicians using a capitated payment scheme, while the Lexington-centered plan (Kentucky Health Select or KHS) opted for a modified FFS reimbursement scheme for physicians with a 20 percent withhold. Another important difference is that the Louisville-centered plan contracted out administrative responsibilities such as utilization review to an experienced managed care organization while the Lexington-centered plan decided to handle such responsibilities internally. The Louisville-centered plan continues to serve Medicaid patients today, while the Lexington-centered plan ceased operations after two and a half years.

A few recently published papers (Duggan (2004) and Aizer, Curie, and Moretti (2007)) have attempted to address similar issues using Medicaid managed care mandates in California that occurred at roughly the same time. The unique implementation of Medicaid managed care in Kentucky and our empirical strategy allow us to make several new and important contributions to the literature. Unlike California, Kentucky required that Medicaid managed care plans provide encounter data for enrollees in a similar format to what was previously reported under the FFS regime. Therefore, a major contribution of our paper is that we observe any changes in utilization among Medicaid recipients moving into managed care. Another novel feature of our paper is that we focus on children enrolled for 30 consecutive months of Medicaid coverage in order to isolate the managed care effect on the utilization of a group for which we

have some priors about potential changes in utilization patterns.⁴ Our focus on the continually enrolled helps to eliminate confounding factors, such as the effect of lagged insurance coverage, on current utilization. A third key feature is that we deal with migration endogeneity by instrumenting actual managed care enrollment with managed care eligibility based on initial county of residence, which we observe nearly one full year before the implementation of managed care.⁵ Fourth, we show that our comparison of border sharing counties in Kentucky makes for a very homogenous set of treatment and control groups. By looking at geographic areas that are contiguous and relatively homogenous – yet treated very differently by the implementation of managed care – we feel more confident that the effects we measure do not represent other omitted county-level factors.⁶ Finally, we use data from the March Current Population Survey (CPS) to investigate whether or not the reform had an impact on Medicaid enrollment decisions of children (i.e. changes along the extensive margin).

Along the intensive margin, we find that both managed care plans decreased outpatient utilization among the children in our sample, though the Louisville-centered plan was able to do so to a greater degree (a 6 percentage point reduction (66 percent) versus a 2 percentage point reduction (21 percent)). In addition, both programs appear to have had a minimal impact on inpatient utilization for children, which may be explained by low baseline inpatient utilization rates. The main difference between the effects of the two programs is that the Louisville-centered plan reduced professional (physician) utilization by 16-17 percentage points (44-47 percent) among children, while in the Lexington-centered plan professional (physician)

⁴ In general, children are much less likely to be hospitalized than adults, so we anticipate that a managed care program would focus on reducing the number of office visits or outpatient services consumed by children.

⁵ Gelbach (2004) finds strong evidence of movement among transfer program recipients in response to different levels of program generosity.

⁶ Our border county approach is primarily motivated by the Black (1999) analysis of the effects of test scores on housing prices.

utilization actually increased by 1-2 percentage points (3-6 percent). Therefore, the heterogeneous treatments generated by differences in plan design between the two regions led to different outcomes with respect to utilization. These results, based on roughly a year and a half of post-reform data, foreshadow the eventual failure of the Lexington-based plan. Along the extensive margin, we see some evidence of movement of children out of Medicaid coverage and into no coverage.

These results should be of interest to policymakers considering Medicaid managed care as a cost-containment measure, given the current financial difficulties facing many states. In fact, Kentucky is considering expansion of its Louisville-based plan as one way of addressing its Medicaid budget deficit. Our analysis of these distinct Medicaid managed care plans suggests that up front plan design decisions, such as the choice of reimbursement mechanism for physicians, may in large part determine the eventual success or failure of the plan.

The rest of the paper proceeds as follows: section II provides a description of the policy change in Kentucky Medicaid. Section III reviews the literature on the impact of managed care on utilization and describes in detail how our approach contributes to this literature. Our methodological approach and identification strategy is described in section IV and our data in section V. Section VI presents our results, section VII offers some discussion of these results as well as some specification checks, and section VIII concludes with some discussion of policy implications and directions for future research.

II. The Introduction of Managed Care in Kentucky Medicaid

Brief History

In October 1995, the commonwealth of Kentucky received Centers for Medicare and Medicaid (CMS) approval of an amendment, the Kentucky Health Care Partnership Program, to

its 1115 waiver, the Medicaid Access and Cost Containment Project, which was originally approved in 1993. This amendment proposed a major restructuring of the Kentucky Medicaid program by dividing the state into eight regional managed care networks. Within each region public and private providers were expected to collaborate to form managed care partnerships to oversee the provision of Medicaid services, rather than contracting these services out to commercial managed care providers. The goals of the amendment were to improve access and quality of care within Kentucky Medicaid, stabilize cost growth, and emphasize primary care and prevention.

In November 1997, Medicaid managed care enrollment began in the two regions that contain the state's two major urban areas, region 3 (anchored by Louisville) and region 5 (anchored by Lexington). The managed care plan covering region 3 was named the Passport Health Plan (Passport) and the managed care plan covering region 5 was named the Kentucky Health Select Plan (KHS). Ultimately, the other six regions were not able to successfully create managed care partnerships. In addition, the region 5 partnership dissolved within two and a half years. Today Medicaid recipients in region 3 are still covered under the Passport managed care plan, while Medicaid recipients in the rest of the state (including recipients in region 5) are covered under Fee-For-Service (FFS) Medicaid.⁷ Table 1 provides trends in overall and managed care eligibility over time. The table suggests that these two regions account for almost half of the state's total population and roughly 35 percent of the state's Medicaid population. Table 1 also suggests that Medicaid is an important potential source of insurance coverage in Kentucky. Our analysis will focus on the heterogeneous impact of Passport and KHS in their respective regions over a 30 month time period, January 1997-June 1999.

⁷ The discussion of the history and institutional structure of the Passport and KHS health plans presented here draws in large part from Barthosch and Haber (2004), a report completed by RTI International for the Centers for Medicare & Medicaid Services.

Passport was charged with providing Medicaid managed care coverage to all Medicaid recipients in Jefferson county (containing Louisville) and 15 surrounding counties, while KHS was charged with providing Medicaid managed care to all Medicaid recipients in Fayette county (containing Lexington) and 20 surrounding counties.⁸ Figure 1 illustrates the 16 Passport and 21 KHS managed care counties. The risk bearing entity behind Passport is University Health Care, Inc., a HMO created by local providers in 1997 for the sole purpose of administering managed care to the Medicaid recipients in region 3. The majority owner of University Health Care, Inc. is the University of Louisville Medical School Practice Association. The risk bearing entity behind KHS was CHA HMO, Inc., a HMO created by a consortium of local providers. The majority owner of CHA HMO, Inc. was the University of Kentucky Hospital. One motivating factor behind these partnerships was to prevent the state from exercising its option to open up for bidding the exclusive rights to these managed care contracts to commercial insurers.

Both plans also agreed to continue reporting encounter data to the state as they had under FFS. Because the plans were made up of local providers that were already accustomed to reporting claims to the state for billing purposes, such an agreement was likely uncontroversial.⁹ This model of having a single community-organized health system (COHS) manage care in a

⁸ There are some Medicaid recipients in these counties that are excluded from managed care. They include those in nursing facilities or psychiatric facilities for an extended stay, those served under home and community-based waivers, and those who must spend down to meet eligibility income criteria. The mandate of Medicaid managed care coverage in these Kentucky counties seems much more binding than that described in California by Duggan (2004). Far fewer sub-sets of recipients are excluded from Medicaid managed care in Kentucky. For example, in California foster children are not required to enroll in Medicaid managed care and in some cases neither are SSI recipients. Coverage for both groups under managed care is mandatory in Kentucky.

⁹ It turns out to be extremely important for our work because this agreement is what allows us to compare utilization rates of Medicaid enrollees in Passport and KHS counties before and after the reform. Such data are not always available to researchers studying the introduction of Medicaid managed care in other states. For example, in the Duggan (2004) analysis of California Medicaid managed care, the only information available about health care consumption among managed care enrollees is the total amount of capitation payments made from the state to the managed care organizations. Therefore, Duggan (2004) does not observe health care utilization by California Medicaid enrollees once they are enrolled in a Medicaid managed care program.

given region without accepting commercial bids was one of several models used in California to implement Medicaid managed care.¹⁰

State Capitation Payments to Passport and KHS

Both Passport and KHS were given the responsibility of providing comprehensive health care coverage for their Medicaid enrollees in exchange for capitation payments (flat monthly fees per recipient based on their category of eligibility) negotiated with the state. In each region, separate monthly capitation rates were negotiated for six different eligibility categories: ADFC/TANF, SOBRA, children in foster care, SSI eligibles with Medicare, SSI eligible without Medicare, and SCHIP. The monthly capitation rates for most of the timeframe we analyze in this paper are presented in table 2. These capitation rates were based in part on Medicaid FFS utilization data from State Fiscal Years 1995 and 1996.¹¹ Due to higher historical utilization patterns, Passport initially received higher capitation rates for almost every eligibility category (Nov 1997-June 1998). However, in fiscal year 1999 the rates were adjusted so that the KHS capitation rates in many eligibility categories exceeded the Passport rates. Appendix table 1 presents a list of the services covered under these capitation payments and those excluded for both plans. The excluded services were to be covered by the state directly through FFS reimbursement or capitated through a separate waiver.

Plan Reimbursement for Providers

The two plans selected very different reimbursement mechanisms for their providers. Passport elected to reimburse primary care providers (PCPs) on a capitated basis, with the

¹⁰ As is discussed in Duggan (2004) and Aizer, Currie, and Moretti (2007), California also used competition between one commercial plan and one private not-for-profit, Medicaid only HMO to select a single managed care provider in some counties. A third model used in some California counties, the Geographic Managed Care (GMC) approach, was to contract with several commercial HMOs and provide individual recipients in a county with choices.

¹¹ See Barthosch and Haber (2004) for a detailed description of determinants of the capitation rates in Kentucky.

capitation rate adjusted for the age, gender, and eligibility mix of their patients (dually-eligible SSI beneficiaries were excluded from capitation). PCPs were at risk for primary care services only, while certain services including prenatal care, EPSDT services, and immunizations would be reimbursed on a FFS basis. In addition, PCPs were eligible for performance-based bonuses based on such activities as extending office hours, maintaining an appointment reminder system, accepting new patients, and meeting goals for utilization of emergency room visits, inpatient days, and specialty referral costs. In order for Passport to better measure resource use, an encounter claims bonus for every non-FFS claim submitted was also established for PCPs. Hospital reimbursement was set up on a per diem basis using the Medicaid fee schedule with a 10 percent withhold.¹²

KHS instead elected to reimburse physicians and hospitals on a FFS basis using the Medicaid fee schedule with a 20 percent withhold. PCPs were organized into "pools of doctors" or PODs and each POD was assigned a budget by KHS. If actual health care expenditures attributed to the POD exceeded the budget, then the proportion of the 20 percent withhold returned to the POD would be reduced. If the POD came in under budget, then the entire withhold would be returned as well as the surplus.

Summary of the Key Differences between the Plans

As described above, a key difference between the two plans was the way in which physicians were reimbursed. Passport used capitation, while KHS opted for FFS with a 20 percent withhold. It is reasonable to assume that this created very different financial incentives for providers in the two regions. Under the Passport plan, the marginal revenue generated for a PCP from an additional office visit is essentially zero. On the other hand, PCPs still received additional revenue from additional visits under the KHS plan. Although the withhold may have

¹² The current Medicaid fee schedule for Kentucky is available at the following URL: <http://chfs.ky.gov/dms/fee.htm>

encouraged some utilization reduction, it is important to note that this was not measured at the level of the individual provider. Therefore, each individual physician may have had an incentive to "free ride" off of the utilization reductions generated by other members of their POD, while keeping their own schedule full.

Another key difference between the two plans was the way in which they performed basic administrative functions, such as claims processing, member/provider services, case management, and information sharing. Passport opted to outsource these responsibilities to an administrative service organization (ASO), AmeriHealth Mercy Health Plan, based in Philadelphia. KHS decided to handle these responsibilities internally, despite a lack of experience at managing a managed care network. To the extent that managed care plans reduce utilization/spending through increased coordination of care and careful review of physician practice patterns, experience in these basic administrative functions is crucial. Passport's choice to outsource these functions to an experienced ASO likely contributed to its relative success at reducing utilization among its enrollees.

These initial choices made by Passport (capitating reimbursement for PCPs and outsourcing important administrative functions to an experienced ASO) created a plan that was in many ways much closer to a "textbook" HMO than the KHS plan. Therefore, we would anticipate Passport to likely be more successful at reducing utilization than KHS. As we discuss further below, this motivates our "heterogeneous treatment" approach of modeling the impact of managed care separately in each region.

III. Literature Review and Our Contributions

While there is no shortage of academic papers examining the impact of managed care on health care utilization and expenditures, as pointed out in Luft (1981), Miller and Luft (1994),

Miller and Luft (1997), and Glied (2000), the vast majority suffer from the inability to identify the “pure” HMO effect due to plan endogeneity. Glied (2000) provides a thorough review of the literature and concludes that most studies rely on multivariate controls to attempt to remove the effects of selection on the results. One obvious exception that focuses on the working age population is the RAND Health Insurance Experiment, which used random assignment into managed care (Manning et al. (1984)). The RAND experiment found managed care enrollees had overall lower health care utilization and expenditures, with fewer hospital admissions and similar use of outpatient services. As mentioned in Glied (2000), these results are broadly consistent with the nonrandomized studies summarized in Luft (1981). Mello, Stearns, and Norton (2002) review the literature on Medicare managed care and find similar results for the Medicare population in their own analysis using simultaneous equations methods.

Kaestner, Dubay, and Kenney (2005) review the literature of the effects of Medicaid managed care on health care utilization and health outcomes. The results here are generally mixed and suffer from the same problems as the general literature on managed care. There are a few recently published studies that take advantage of California county-level Medicaid managed care mandates in a similar fashion to our paper. Duggan (2004) examines the impact of managed care on Medicaid spending and birth outcomes. Aizer, Currie, and Moretti (2007) also examine the impact of managed care on birth outcomes.

There are several differences between the Kentucky reform and the California reform that we exploit to our advantage. First, unlike in Kentucky, the California Medicaid managed care data used in the literature has no information on utilization for Medicaid managed care recipients. Duggan (2004) avoids this problem by focusing on Medicaid capitation payments rather than utilization in his individual level analysis and by looking at birth outcomes at the

county level using hospital discharge data rather than Medicaid claims data. Aizer, Currie, and Moretti (2007) avoid this problem by focusing on birth outcomes, rather than overall utilization, using the California Birth Statistical Master File and Birth Cohort files. A second issue with the California Medicaid data is that the mandates for managed care were not binding for much larger groups of recipients and services than in Kentucky. For example, in some California counties undocumented workers, SSI recipients, and foster children were not required to participate in Medicaid managed care. In Kentucky, Medicaid managed care is mandatory for SSI recipients and foster children if they live in any of the managed care counties. Both California papers attempt to deal with this issue in their analysis of birth outcomes by focusing on those in their data for whom the managed care mandate is most likely to be binding.

Our empirical approach also differs from the previous literature in several important ways. First, we focus on health care utilization, rather than expenditures, exploiting the unique nature of the Medicaid data available in Kentucky. Therefore, our paper is most closely related to the Duggan (2004) individual level analysis of the impact of managed care on Medicaid expenditures (as measured by state capitation payments). Economic theory makes more unambiguous predictions about the impact of managed care on utilization (Q) relative to expenditures ($P*Q$), because it is often harder to predict or measure how managed care will affect health care prices (P). In addition, as discussed in more detail below, we focus on children enrolled for the entire 30 month time period analyzed in order to more accurately measure their complete health care utilization and avoid confounding factors such as the effect of lagged insurance coverage on current utilization. Third, we control for migration endogeneity by creating an instrument for current managed care enrollment based on initial county of residence, measured nearly one full year before managed care implementation began. Fourth, one could

also argue that we are comparing much more homogenous groups than in Duggan (2004) due to the more uniform nature of the mandates in Kentucky and by focusing on children in extremely similar neighboring counties. Finally, we use data from the March CPS to investigate whether or not the reform had an impact on Medicaid enrollment decisions of children.

IV. Methods and Identification Strategy

Identifying the Impact of Medicaid Managed Care

It is well recognized by health economists that selection bias represents a key barrier to assessing the impact of managed care on utilization. In many settings, especially in the private market, consumers have the choice between some form of a managed care plan and a FFS plan. Since the managed care plan represents the cheaper, but less generous option, it will tend to be more attractive to healthier individuals.¹³ We refer to this as "plan endogeneity." Thus the lower costs per managed care enrollee may reflect more stringent financial incentives on providers and alternative delivery methods, a healthier pool of participants (plan endogeneity), or both. To identify the "pure" HMO effect one needs to keep the health composition within each type of plan constant, and, in general, OLS estimates will fail to do so and thus overstate the pure HMO effect.

In the context of public health insurance, especially Medicaid, the selection issues are perhaps somewhat different. The Medicaid population is poor and typically faces no copayments, premiums, or deductibles. In some contexts – such as the California Medicaid managed care setting that Duggan (2004) and Aizer, Currie and Moretti (2007) studied – recipients were initially able to voluntarily choose Medicaid managed care or stay in FFS, and then some California counties later mandated managed care enrollment. At least in the voluntary

¹³ Cutler and Reber (1998) show that younger and healthier individuals at Harvard switched to less generous health plans after cost-sharing arrangements were changed, leading to an "adverse selection death spiral."

setting, it is not clear that the financial incentives to be in a managed care plan are very strong because Medicaid FFS plans tend to have little patient cost-sharing. Thus, it is not clear whether the selection bias will be the same as in the private setting.

In the Kentucky context, the switch from FFS to managed care was mandatory for a large portion of the Medicaid population, occurred at essentially one point in time, and was implemented in some, but not all Kentucky counties. In other words, a Medicaid recipient could not simply choose to opt into a managed care program, instead enrollment was based purely on county of residence. Therefore, enrollees in certain counties were automatically enrolled in managed care, while those in neighboring counties outside the managed care boundaries were not. This description of managed care implementation in Kentucky suggests a “difference-in-differences” approach to identify the impact of managed care on health care utilization that is free from the “plan endogeneity” that plagues much of the literature.

One option for implementing this “difference-in-differences” approach would be to collect monthly enrollment and utilization data on all Medicaid enrollees in all 120 Kentucky counties before and after the reform. We could run a regression with an indicator of any monthly utilization as the dependent variable and an indicator of managed care enrollment, which would equal zero for all recipients in the pre-period and equal one for those living in one of the 37 managed care counties in the post period, as the independent variable. Thus we would be comparing the monthly utilization of those living in the 37 managed care counties before and after the reform with those living in any of the other 83 counties (see figure 1).

While such an approach would shed some light on the impact of managed care, it suffers from several problems. First, it would treat managed care counties containing Kentucky's largest cities (Louisville in Jefferson county and Lexington in Fayette county) the same as much more

rural managed care counties. In addition, these cities served as the "hub" for managed care activities within their respective regions, so they are also different from more rural areas in that regard. It may be the case that because Jefferson county contains Louisville, it is too different from other Kentucky counties for any comparison to be feasible. Second, it may not be reasonable to use counties in the far eastern or western parts of the state as controls for managed care counties in central Kentucky. Table 3 provides a descriptive comparison of each of the eight proposed managed care regions using "QuickFacts" data from the U.S. Census and confirms that there are important differences between the regions.¹⁴ Third, there are also important differences in utilization patterns in adults versus children, so an analysis of all enrollees would ignore these differences. Finally, it does not address the potential endogeneity of residence. Enrollees may move across county lines in order to opt in or opt out of managed care. We refer to this as "migration endogeneity."

Given these concerns, an alternative approach would be to focus our attention on enrollees in the outermost counties in both managed care regions that share a border with a FFS county. These outermost managed care counties and their FFS neighbors are likely to make for much more homogenous treatment and control groups than would be the case if we used all 120 counties. These outermost managed care counties are also more likely to have been "followers" rather than "leaders" in terms of setting managed care policy for their regions. This "border county" approach is motivated by, among others, the Black (1999) analysis of the effects of school test scores on housing prices. By looking at geographic areas that are contiguous and relatively homogeneous - yet are treated very differently by the implementation of managed care

¹⁴ Table 3 suggests that the Passport region (region 3) has a lower percentage of white inhabitants than any other region and is among the highest in terms of high school graduation rates. The KHS region (region 5) has the second lowest percentage of white inhabitants and the lowest homeownership rate. The poverty rate in both managed care regions is much lower than in regions 4, 7, and 8.

- we feel more confident that any measured impacts do not represent other omitted county-level factors.

In order to address migration endogeneity, we could use managed care eligibility based on county of residence in January 1997 as a proxy for actual managed care enrollment.

Presumably, choice of residence in January 1997 is exogenous to the implementation of the Medicaid managed care that occurred in November 1997. We discuss this further below.

Finally, we could focus on our attention on children enrolled continuously throughout our 30 month timeframe (January 1997-June 1999).¹⁵

While this alternative approach may sound promising, there is one additional issue to be addressed, whether or not it makes sense to model the managed care "treatments" in each region as being homogeneous. The description of the differences in implementation across the two regions suggests that we should model the impact of managed care in each region separately.

Our use of separate border county FFS control groups for each region should handle other baseline differences between the two regions, such as differences in baseline utilization. In

¹⁵ Some authors use individuals with Medicaid spells as short as one month, yet there are a number of problems with using short Medicaid spells to analyze the impact of managed care. The first problem with short enrollment spells is that Medicaid eligibility changes are associated with other changes in socioeconomic circumstances (such as changes in income, private insurance status, and marital status of the parent) that are difficult to observe in administrative data but may independently affect health care utilization. For example, children who newly enroll in Medicaid due to a drop in parent's income (and perhaps loss in private health insurance) may have utilization that is incorrectly attributed to the managed care or FFS arrangement rather than the drop in income. On the other hand, children who are made eligible for Medicaid due to marital dissolution may be less likely to use health care due to the increased time constraints on the single parent. A second issue is that lagged insurance coverage could affect current utilization. For example, uninsured children who enroll in Medicaid may initially have increased utilization due to pent-up health care demand, yet this could be incorrectly identified as a HMO effect. Third, as Cutler and Gruber (1996) note, there are children who are eligible, but not participating in the Medicaid program who might be viewed as having conditional Medicaid coverage. What this means is that when the child gets sick, it may be relatively easy to enroll the child in Medicaid. Similar to the pent-up demand story, conditional coverage may incorrectly attribute utilization to managed care or FFS plans. For each of the reasons, the results from the Duggan (2004) analysis of California are likely to be biased if there are differential take-up rates in managed care and FFS counties. Although we observe long-run insurance status and utilization far more accurately than previous work, by restricting the sample of Kentucky children to those who were continuously enrolled, it is likely that the children are poorer and less mobile than other Medicaid recipients; thus our results may not be generalizable to the Medicaid population as a whole.

addition, our focus on children allows for clean predictions about the likely impact of managed care on utilization.

To summarize our empirical strategy, we define separate treatment and shared-border control counties for each of the two managed care regions and track the utilization of all children that i) live in those counties in January 1997 and ii) are continuously enrolled in Medicaid until June 1999. Figure 2 illustrates the 4 Passport treatment and 7 control counties as well as the 9 KHS treatment and 14 control counties used in this analysis.¹⁶ Table 4 provides a descriptive comparison of the treatment and control counties using “QuickFacts” data from the U.S. Census. The first two columns describe the Passport treatment and control counties, followed by the KHS treatment and control counties. We also present descriptions of Passport and KHS counties that share a common border. For both Passport and KHS, the treatment and control counties seem very similar in terms of measurable county-level characteristics. Differences across the two regions further motivate separate Passport and KHS analyses. Finally, it is interesting to observe how similar the Passport and KHS counties are that share a common border. Later we compare the impact of the different managed care "treatments" in each these two similar sets of counties.

Empirical Model Specification for Analyzing Changes along the Intensive Margin

As mentioned above, the key issue which motivates the instrumental variables approach we adopt in this paper is that mobility across Kentucky counties is non-trivial, and could be correlated with the implementation of Medicaid managed care. Put differently, location could be endogenous to health status and Medicaid generosity. In the broader literature on welfare benefits, Gelbach (2004) convincingly finds that among women likely to use welfare, movers

¹⁶ The Passport treatment counties are Breckinridge, Grayson, Larue, and Marion and the control counties are Hancock, Ohio, Butler, Edmonson, Hart, Green, and Taylor. The KHS treatment counties are Lincoln, Rockcastle, Jackson, Estill, Powell, Montgomery, Nicholas, Harrison, and Owen and the control counties are Pulaski, Laurel, Clay, Owsley, Lee, Wolfe, Menifee, Bath, Fleming, Robertson, Bracken, Pendleton, Grant, and Gallatin.

move to higher-benefit states, and do so earlier in the life cycle. If one believes that state-to-state moves occur due to differences in cash welfare generosity, then county-to-county moves (which are clearly less costly for families) due to differences in Medicaid generosity is an important issue to account for.

To do so, we argue that county of residence in January 1997 is exogenous to the implementation of the Medicaid managed care that occurred in November 1997. Thus, we predict managed care enrollment separately in each region based on the interaction of two variables: time period (pre- or post-implementation) and whether the initial county of residence becomes a managed care county. In other words, in each region we are using managed care eligibility based on county of residence in January 1997 as an instrument for actual managed care enrollment. Our first stage models for each region, estimated as linear probability models, are given below:

$$\begin{aligned}
 HMO_{ijt} = & \beta_0 + \beta_1 HMO_elig_Passport_initial_county_i + \beta_2 Post_t & (1a) \\
 & + \beta_3 Age_6-12_{it} + \beta_4 Age_13-18_{it} + Month_Year_Dummies \beta_5 + \alpha_i + \\
 & \varepsilon_{ijt}
 \end{aligned}$$

$$\begin{aligned}
 HMO_{ijt} = & \beta_0 + \beta_1 HMO_elig_KHS_initial_county_i + \beta_2 Post_t & (1b) \\
 & + \beta_3 Age_6-12_{it} + \beta_4 Age_13-18_{it} + Month_Year_Dummies \beta_5 + \alpha_i + \\
 & \varepsilon_{ijt}
 \end{aligned}$$

where HMO represents actual managed care enrollment for child i in county j at time t , $HMO_elig_Passport_initial_county$ represents simulated Passport enrollment for child i based on initial county of residence, $HMO_elig_KHS_initial_county$ represents simulated KHS enrollment for child i based on initial county of residence, $Post$ is a dummy variable equal to 1

starting in November 1997, the first month of managed care implementation, and *Month_Year_Dummies* is a vector containing an indicator for each of the 30 months (Jan 1997-June 1999) in our sample. We also include two indicators for different child ages, child fixed effects (α_i), and ε_{ijt} represents a standard error term.

In these specifications, the coefficient (β_1) on simulated program enrollment based on initial county is the instrumental variable which determines whether the child is actually enrolled in managed care (*HMO*), but should not affect health care utilization except through its effect on managed care enrollment. As will be discussed in more detail below, this leads to a very strong first stage for each region, with a marginal managed care participation rate in our Passport sample of 69 percent (with a standard error of 0.2 percent) and a marginal managed care participation rate in our KHS sample of 79 percent (with a standard error of 0.1 percent); note that the marginal take-up rate is not 100 percent in either region due to some difficulty in measuring managed care enrollment in the first 4 months of the reform and some children moving across county lines.

Our second stage, which examines three types health care utilization (professional, outpatient, and inpatient services), is also estimated as a separate linear probability model for each region:

$$\begin{aligned}
 \text{Any_Monthly_Utilization}_{ijt} = & \beta_0 + \beta_1 \text{HMO}_{ijt} + \beta_2 \text{Post}_t \\
 & + \beta_3 \text{Age_6-12}_{it} + \beta_4 \text{Age_13-18}_{it} + \text{Month_Year_Dummies} \beta_5 + \alpha_i + \\
 & \varepsilon_{ijt}
 \end{aligned} \tag{2}$$

where *Any_Monthly_Utilization_{ijt}* is a dummy variable equal to 1 if child *i* in county *j* used one of our measures of health care utilization in month *t* (outpatient, professional, or inpatient), *HMO* represents actual HMO enrollment in our OLS specifications and predicted HMO enrollment from the first stage in our IV specifications, and the other variables are defined as before.

Empirical Model Specification for Analyzing Changes along the Extensive Margin

Although our Medicaid administrative data allows us to precisely measure health care utilization for children, one limitation is that it is less useful for measuring impacts along the extensive margin, i.e., the decision to participate in Medicaid. If one views switching from FFS to managed care as implicitly reducing the generosity of Medicaid, then one may expect both reductions in utilization (which we measure with the administrative data) and reductions in program participation.¹⁷ Focusing on utilization alone may therefore ignore an important part of the cost-savings from switching to managed care and a margin of adjustment that may also be important to policymakers.

Because we rely on the household-based March Current Population Survey (CPS) to examine participation, our empirical approach is slightly different than for the intensive margin. We focus on repeated cross-sections of children under age 18 from Kentucky, and estimate linear probability models of the form:

$$\begin{aligned} INSURANCE_{ijt} = & \beta_0 + \beta_1 Managed_Care_Current_County_{it} + X_{ijt} \beta_2 \\ & + Year_Dummies \beta_4 + Region_Dummies \beta_5 + \varepsilon_{ijt} \end{aligned} \quad (3)$$

where $INSURANCE_{ijt}$ represents Medicaid coverage, private coverage, or no coverage, and is a dummy variable equal to 1 if the child had that coverage at any time during the previous calendar year. Since the dataset is cross-sectional, we cannot observe county-to-county moves over time in the CPS; instead we construct $Managed_Care_Current_County_{it}$, a population-weighted probability that the child currently resides in a managed care county (and thus would be forced to

¹⁷ Yelowitz (1998) found that the rising value of Medicaid for the SSI-disabled population was responsible for 20 percent of caseload growth from 1987 to 1993.

participate in managed care if the child enrolled in Medicaid). This probability varies, of course, over time, and also because we observe larger metropolitan areas rather than individual counties.

Approximately 42 percent of CPS respondents live in one of three metropolitan areas: the Louisville MSA, the Lexington MSA and the Cincinnati MSA (which includes northern Kentucky). The remaining 58 percent live in unidentified counties in Kentucky, and some of these unidentified counties also participate in Medicaid managed care. All children are assigned a probability of zero for *Managed_Care_Current_County* in 1996 and 1997 (since Medicaid managed care began in November 1997); children in the Louisville MSA are assigned a probability of 1 from 1998 to 2002 (the final year of the CPS used here). Children in the Lexington MSA are assigned a probability of 1 in 1998 and 1999, and 0 thereafter. Children in the Cincinnati MSA are always assigned a probability of 0.

The remaining children (which make up more than half the sample), are spread amongst counties that are in the Passport region, the KHS region and other non-managed care regions. Based on population, the Louisville MSA contains about 70 percent of the total Passport beneficiaries, and the Lexington MSA contains about 65 percent of the total KHS beneficiaries. Thus, a significant number of managed care beneficiaries are present in the unidentified counties. For children in unidentified counties, we assign to *Managed_Care_Current_County* a population-weighted probability of living in a managed care county of 0.256 in 1998 and 1999, when both Passport and KHS were in operation. This probability drops to 0.141 from 2000 to 2002, when KHS ceased operations and the Lexington region switched back to FFS coverage.

With these probabilities, the coefficient β_l measures the marginal impact of switching to Medicaid managed care on Medicaid participation, private insurance coverage, and no insurance. The vector X_{ijt} measures child- and family-characteristics reported in the CPS, including child's

age (measured linearly), sex, race, the family's income (dummies for under 100 percent of poverty, between 100-200 percent, between 200-300 percent, and over 300 percent), and family homeownership status. The models also include fixed effects for calendar year (1996-2002) and geographic regions (Louisville MSA, Lexington MSA, Cincinnati MSA, and unidentified). In the results section, we present a variant of equation (3) where we include, in addition to the calendar year and region dummies, a region-specific time trend. We also present results excluding imputed values for health insurance coverage. Finally, we present a "difference-in-difference-in-differences" specification in which we interact *Managed_Care_Current_County* with poverty status in order to assess whether or not the impact of the introduction of managed care varies by family income.

V. Data

Intensive Margin

In order to implement our empirical analysis of changes along the intensive margin, we were provided with de-identified, linked Medicaid claims and enrollment data by the Kentucky Cabinet for Health and Family Services. As described above, for each region our sample consists of children that i) live in the region's treatment or control counties in January 1997 and ii) are continuously enrolled in Medicaid until June 1999.¹⁸ We were extremely fortunate that there were no changes in the company managing the Kentucky Medicaid information systems during this 30 month timeframe.

EDS was responsible for managing Medicaid information systems for Kentucky from 1994 to 2000 and a new vendor, UNISYS, began managing these databases in January 2000.

¹⁸ Note that we are not requiring these children to live continuously in one of the treatment or control counties, only that they maintain Kentucky Medicaid enrollment. Therefore, a child may live in a Passport treatment county in January 1997 then move to any other part of the state for the remaining 29 months in our analysis and stay in the sample, as long as they maintain their public coverage.

During transitions to new vendors with new database models, the medical claims information goes through a testing and verification period for about one year. We are not confident in the comparability of the new Unisys database with the previous system during this intermediate period, which is why we end our analysis in June 1999 (several months before the transition). The benefits of using this timeframe include the fact that it spans the reform we are investigating and we are assured the changes in utilization we observe are not being driven by vendor changes. The cost is that we cannot observe utilization changes as a result of the termination of the KHS plan.

After dropping a few children with age discrepancies, we are left with 4,706 children in our Passport sample (1,890 initially in one of the 4 Passport treatment counties we are interested in and 2,816 initially in one of the 7 control counties) and 13,590 children in our KHS sample (4,273 initially living in one of the 9 KHS treatment counties we are interested in and 9,317 initially living in one of the 14 control counties). Descriptive statistics from our final samples for each region (split into treatment and control sample sub-categories) are shown in table 5. Comparing the 1,890 children initially in a Passport county with the 2,816 initially in a bordering FFS county, we see that there was a slightly lower probability of moving across county lines among the Passport children (24 percent versus 26 percent). On the other hand, there are more movers among the children initially in a KHS county than their FFS controls. The amount of moving that we observe in both regions reinforces the motivation for our IV approach to control for migration endogeneity. In general table 5 reinforces the finding from table 4 that we are comparing extremely homogenous sets of counties within each region. The children in our final Passport and KHS samples appear extremely similar to their FFS controls in terms of demographics and pre-reform utilization.

Our health care utilization data – which is recorded regardless of whether the payment arrangement is FFS or managed care – is at the monthly level. Inpatient services are defined to be services delivered in a hospital with an overnight stay, while outpatient services are services delivered in clinics or hospitals in which there is no overnight stay. Professional services typically represent physician services, but could also include services provided at locations other than physician offices, such as dental clinics and public health clinics. The bottom of table 5 presents the monthly utilization rates for each type of service in the pre-period (January 1997-October 1997) and the post-period (November 1997-June 1999) for children in each set of counties of interest. These numbers in many ways tell the entire story. We see large reductions in mean outpatient and professional utilization for children initially living in the Passport counties that is not matched by children initially living in the non-Passport border counties. Children initially living in the KHS counties, while experiencing some reduction in mean outpatient utilization, actually have a slight increase in mean professional utilization. They tend to look much more similar to children initially in the non-KHS border counties (i.e. children continuing to receive FFS Medicaid).

The heterogeneous impact of the two different managed care "treatments" is made especially clear in figures 3 and 4. Figure 3 compares for each of the three types of services differences in the mean monthly utilization rate for the 1,890 children initially living in a Passport county (labeled "treatment") to the mean utilization rate for the 2,816 children initially living in a non-Passport border county (labeled "control"). We see similar utilization rates in the pre-period for each type of service and then striking reductions in outpatient and professional utilization for the Passport treatments relative to their controls. There seems to be less of a

managed care impact on inpatient utilization, but the extremely low baseline utilization rate makes the possibility of a significant reduction less likely.

Figure 4 provides the same comparison for our KHS treatment and control samples. These graphs clearly tell a different story. We again see similar utilization rates between the treatment and control counties in the pre-period. The KHS pre-period utilization rates also appear to be very similar to the Passport pre-period utilization rates, with slightly lower outpatient and professional rates and a slightly higher inpatient rate. In the post-period, we see very little difference between the KHS treatment utilization rates and the controls. Therefore, these graphs suggest a very strong impact of the managed care treatment associated with the Passport program and almost no impact of the managed care treatment associated with the KHS program. Our empirical results presented in the next section will formalize these findings.

Extensive Margin

To examine Medicaid participation, we must rely on non-administrative data, since our administrative data only follows children when they are participating in Medicaid. Children can become ineligible for Medicaid for many reasons including increases in family income, changes in family structure, aging out of an eligibility group, moving out of the state and obtaining private health insurance. In order to examine the impact of managed care on Medicaid participation, we rely on the 1997-2003 March CPS Annual Social and Economic Survey (ASEC) (U.S. Department of Commerce, Bureau of the Census, 2003). We use a larger set of years for this analysis because the CPS questionnaire was uniform over the entire period, and by using all of these years, we are able to exploit a longer “pre-” period, as well as exploiting the fact that managed care was eventually repealed in the KHS region.

The CPS is recognized as a credible and widely respected survey. It is administered by the Bureau of the Census for the Bureau of Labor Statistics and has been conducted for more than 50 years.¹⁹ It currently surveys nearly 80,000 households for the March supplement and asks questions that specifically address issues of health coverage and health insurance. The response rate for the March survey is exceptionally high for a voluntary, household-based survey.²⁰ The sample is scientifically selected to represent the civilian non-institutional population. The Census Bureau states that the CPS sample provides estimates for the nation as a whole and serves as part of model-based estimates for individual states and other geographic areas. The CPS is conducted by telephone and in person (and thus includes residences without telephones).

The ASEC asks detailed questions about health insurance for the entire previous calendar year. Thus, our dataset contains information on the 1996 to 2002 time period. Health insurance status is asked for all household members; the survey includes questions about employer-provided health insurance, private health insurance, and government insurance. The CPS does not directly ask people whether they are uninsured, rather it asks about specific types of insurance and respondents who answer “no” to all of the categories are considered uninsured. It asks respondents about coverage at any time during the preceding calendar year, so being uninsured reflects a lack of health insurance throughout the entire previous calendar year. In the

¹⁹ Here is the URL for the BLS website: <http://www.bls.census.gov/cps/overmain.htm>

²⁰ The CPS has a large percentage of in-person interviews, which improves coverage and reliability and leads to a very high response rate. Interviewers use laptop computers to administer the interviews, asking questions as they appear on the screen and directly entering the responses obtained. Households are interviewed eight times over the course of sixteen months. During the first and the fifth interviews, an interviewer usually visits the sample unit. Almost all of the remaining interviews are conducted by telephone. Even though the CPS is a voluntary survey, the March interview of recent years has between 92 and 93 percent of the eligible households providing basic labor force information and between 80 and 82 percent of the eligible households completing the Annual Social and Economic Survey supplement. See <http://www.bls.census.gov/cps/ads/1995/sdacodes.htm> , <http://www.bls.census.gov/cps/ads/1995/smethovr.htm> , and http://www.bls.census.gov/cps/ads/2002/S&A_02.pdf for additional discussion.

analysis that follows, we use health insurance definitions identical to those of the Census Bureau.²¹

We initially extracted 13,990 Kentucky respondents – both children and adults – from the March 1997 to 2003 CPS. In our empirical results, we restrict attention to the 27 percent of respondents (3,839 respondents) that were under the age of 18. Approximately 42 percent of these respondents lived in the Louisville, Lexington or Cincinnati metropolitan areas and the remainder lived in unidentified areas. More than 28 percent of these respondents had some form of imputed information on health insurance; as a result, we estimate all specifications both including and excluding imputed values.²²

Over the entire 1996 to 2002 time period, among children under 18, roughly 23 percent participated in Medicaid, 64 percent had private insurance and 12 percent were uninsured.²³ Medicaid coverage among children fell from 25 percent in 1996 and 1997, to 18-20 percent in 1998 to 2000, and then increased again to 24-25 percent in 2001 and 2002. Although this pattern is certainly consistent with the implementation and repeal of managed care affecting Medicaid participation, clearly other factors matter as well. Kentucky – like the rest of the United States – was experiencing substantial economic growth in the late 1990s, and then that growth stopped with the 2001 recession. The unemployment rate in Kentucky fell from 5.1 percent in 1996 to 4.1 percent in 2000, but increased to 5.6 percent by 2002.²⁴

²¹ To be more specific, the CPS explicitly asks about private insurance coverage, employer-based coverage, employer-based coverage in one's own name, direct privately purchased insurance, Medicare, Medicaid, and CHAMPUS. It defines "uninsured" as not being in any of the other categories. The health insurance definitions can be found at: <http://www.census.gov/hhes/hlthins/hlthinsvar.html>

²² Bollinger and Hirsh (2006) find that in the context of earnings in the CPS, coefficient bias due to the imperfect imputation is widespread and often severe. They suggest, in the context of earnings, that a simple alternative is to exclude imputations, and base estimates on a respondent-only sample.

²³ When examining the non-imputed values, private coverage was somewhat lower, and Medicaid coverage and no coverage were somewhat higher.

²⁴ For more detail, see the following BLS website: http://www.bls.gov/schedule/archives/all_nr.htm#SRGUNE

Almost 90 percent of the CPS sample is white, and virtually all remaining children are African-American. More than 20 percent of children live in poverty, and nearly 22 percent live in “near-poverty.” Approximately 22 percent live in the Louisville MSA, and another 11 percent live in the Lexington MSA; thus, a substantial fraction of the sample was subject to the managed care mandate after 1997.

VI. Results

Passport (Louisville area HMO) - Intensive Margin

Table 7 presents the results of a series of regressions based on equation (1a) for the Passport region where the dependent variable in each model is a (0, 1) indicator of any monthly utilization of either professional, outpatient, or inpatient Medicaid services. The key independent variable of interest is managed care enrollment (*HMO*). In order to isolate the effect of the Passport managed care program on utilization, each model includes a series of month year dummies and child fixed effects. The OLS estimate presented in column 1a suggests that the introduction of the Passport program led to a statistically significant 16 percentage point decline in the probability of any Medicaid professional utilization for the children in our sample. This is relative to a monthly professional utilization rate of 32.36% in the pre-reform period, so a 16 percentage point decline represents a 44% ($=.16/.3613$) reduction in the overall monthly probability of any Medicaid professional utilization. The other OLS estimates suggest a statistically significant 6 percentage point ($66\% = .06/.909$) decline in the monthly probability of any outpatient utilization and a modestly statistically significant .1 percentage point ($18\% = .001/.0057$) decline in the monthly probability of any inpatient utilization.

Identification in the OLS models is achieved through the assumption that this Medicaid reform in Kentucky is an exogenous change to insurance type, not driven in a given county by

some sort of related changes in Medicaid spending / utilization (policy endogeneity) or because of changes in the characteristics of recipients (migration endogeneity).²⁵ In our IV models we address migration endogeneity by instrumenting actual managed care enrollment with Passport eligibility based on initial county of residence. Because we first observe each child in our sample in January 1997, we are assuming then that their county of residence in January 1997 is exogenous to the implementation of managed care in November 1997.

Table 6 presents the results of the first stage regression in which Passport eligibility based on initial county of residence is used to predict actual managed care enrollment (*HMO*). The instrument is clearly a very strong predictor of actual managed care enrollment with a marginal managed care participation rate of 69 percent (with a standard error of 0.002 percent). As mentioned, this estimated marginal take-up rate is not 100 percent because of difficulty in measuring managed care enrollment in the first 4 months of the reform and some children moving across county lines, potentially into the KHS managed care area.

How does the instrument impact the second stage results? The results reported in Table 7 suggest that using an IV approach leaves the coefficient estimates largely unchanged. There is no change in the predicted impact on outpatient services and a slightly larger predicted impact on professional services (17 percentage points versus 16 percentage points). The predicted impact on inpatient utilization is no longer statistically significant at conventional levels (p-value = .213). These results suggest that migration endogeneity is not a major source of bias to our OLS estimates of the impact of Passport on health care utilization.

Overall, we see that the introduction of Passport led to relatively large reductions in outpatient and professional utilization, with slightly less statistical support for a reduction in

²⁵ As is argued in Duggan (2004) in the case of California, one could argue in Kentucky that since the planning for the introduction of managed care preceded the actual implementation by multiple years, policy endogeneity is unlikely to be a big issue.

inpatient services. Because our analysis is focused on children, this is not a surprising result given the low overall inpatient utilization rate observed for our Passport sample (.57%). A managed care program would likely have more success targeting outpatient and professional service utilization for reductions among their child enrollees. Therefore, our Passport findings are in line with the general literature on managed care in terms of finding reductions in utilization, but the composition of those reductions differs due to the fact that we are focusing on children.

Kentucky Health Select (Lexington area HMO) - Intensive Margin

Table 9 presents results of a similar specification estimated using our Kentucky Health Select (KHS) sample. The OLS estimate presented in column 1a suggests that the introduction of the KHS program actually led to a statistically significant 2 percentage point (6% = .021/.3488) increase in the probability of any Medicaid professional utilization. The other OLS estimates suggest a statistically significant 2 percentage point (16% = .02/.0979) decline in the monthly probability of any outpatient utilization and a marginally significant .1 percentage point (20% = .001/.0050) increase in the monthly probability of any inpatient utilization (p-value = .099). As was the case with our Passport analysis, using an IV approach leaves the KHS coefficient estimates largely unchanged, with a loss of statistical significance for the inpatient results. Therefore, these results also suggest that migration endogeneity is not a major source of bias.

Both Passport and KHS decreased outpatient utilization among the children in our sample, though Passport was able to do so to a greater degree (66% reduction versus 16%-21% reduction). In addition, both programs appear to have had a minimal impact on inpatient care utilization for children, which, as mentioned, is not terribly surprising given the low overall

utilization of inpatient services for children. The main difference between the effects of the two programs is that Passport reduced professional utilization by 44%-47%, while KHS actually increased professional utilization by 3%-6%. As we will discuss in further detail below, this may be due to differences in the way that each program reimbursed physicians. Recall that Passport set up a capitated system to reimburse local physicians, while KHS opted for fee-for-service (FFS) reimbursement with a 20% withhold.

Comparing Border Counties - Intensive Margin

As a specification check, we compared utilization pre- and post-reform for 5 Passport (Washington, Nelson, Spencer, Shelby, and Henry) and 4 KHS (Boyle, Mercer, Anderson, and Franklin) counties that were excluded from the analysis described above, because they share borders with one another. Table 4 suggests that these counties are extremely similar, other than the managed care region they were assigned to. Figures 5a, 5b, and 5c present outpatient, professional, and inpatient utilization comparisons respectively. These figures suggest similar utilization rates in both sets of counties prior to the reform, then stronger utilization reductions in the Passport counties than in their KHS neighbors.

Extensive Margin

Table 10 presents the results on the impact of Medicaid managed care for children along the extensive margin. The first column, top panel shows that the implementation – and repeal – of managed care was associated with a highly significant and economically important decline in Medicaid participation. The reduced-form coefficient estimate implies that managed care reduced Medicaid participation by 10.5 percentage points, from a pre-reform baseline of approximately 25 percent. In the time series, participation dropped by around 5 percentage points, suggesting that virtually all the drop in Medicaid participation occurred in the managed

care regions. The first column, bottom panel shows that the no insurance coverage model estimated coefficient is roughly equal and opposite in sign. Thus managed care appears to shift children from Medicaid coverage to being uninsured. These results are both highly significant.

One cause for concern, however, relates to the effects of managed care on private coverage: one might expect that if managed care implicitly cut the generosity of Medicaid, then children will leave Medicaid and either obtain private coverage or become uninsured. Yet, the coefficient in the private insurance coverage model is negative and marginally significant (first column, middle panel). These results on private coverage (as well as Medicaid and no coverage) are robust to a number of changes in the model specification: the second column includes region-specific time trends, and the third column includes these trends and excludes imputed values. In all three cases, the conclusion appears the same: the implementation of managed care reduces Medicaid participation and increases un-insurance by approximately the same amount, yet private coverage falls rather than rises.

To explore this result further, Table 11 estimates models the impact of managed care for poor and near-poor children, as well as richer children. These models use the same specification as in third column of the previous table. The first two columns stratify the sample by income and estimate identical “difference-in-differences” models as the previous table, while the third column estimates a “triple difference” model by interacting family income level with the likelihood of managed care coverage (MCCC). The final column shows that the entire effect of managed care on Medicaid participation was concentrated exclusively among poor and near-poor children, and that there was no effect on richer children. On the other hand, the “impact” of managed care on private coverage was the same for both rich and poor children and the impact of managed care on un-insurance was larger for poor and near-poor children than for richer

children. The results for richer children strongly suggest that other market-wide changes – besides managed care – affected health insurance and were occurring in the Passport and KHS regions over time, differentially from the rest of the state. Nonetheless, the results on Medicaid participation are striking, and suggest that reducing the generosity of Medicaid reduces participation in the program.

VII. Discussion and Specification Checks

In the previous section, we exploited the large initial size of our administrative dataset in order to create treatment and control groups that overcame many of the standard objections that would arise in a quasi-experimental setting. By following the same set of continuously-enrolled children in geographically contiguous counties who were differentially affected by region-wide transitions to Medicaid managed care, our empirical approach is able to address concerns about omitted variables bias and endogeneity. In doing so, we find substantively large drops in utilization in the Passport region, but not in the KHS region.

This section shows how our conclusions would change from using a larger, but more geographically imbalanced sample. Recall that our “Passport experiment” used only four of sixteen counties in Region 3 for the treatment group, as well as seven contiguous counties outside of Region 3 for the control group. The “KHS experiment” used nine of twenty-one counties in Region 5 for the treatment group, and fourteen counties outside of Region 5 for the control group. In addition, given the differences in plan design, the managed care “treatment” was fundamentally different in the two regions.

Table 12 shows the results of expanding the sample using the same IV methods that were used in Tables 7 and 9 (the coefficients from those tables are presented in the first two rows of Table 12 as reference). First, we combine the two quasi-experiments, estimating the effect of

managed care without regard to the underlying differences between the two regions. As might be expected, the treatment effect of managed care is essentially a weighted average of the treatment effects in the two managed care regions. Overall, professional utilization falls by 0.04 percentage points, far smaller than the 17 percentage point drop in the Passport region, but a substantially larger drop than the 0.01 percentage point increase observed in the KHS region. The conclusions for outpatient utilization mirror those for professional utilization, while the effect on inpatient utilization is in all cases insignificant. We conclude that ignoring the underlying incentives created by different forms of managed care can lead to very different conclusions about its effect on utilization.

Next, we expand our sample to include continuously-enrolled children in all Region 3 and Region 5 counties as the treatment group, and all continuously-enrolled children in the other six regions as the control group. It should be clear that doing so makes the treatment and control groups far more heterogeneous. Relative to the approach of focusing on geographically contiguous regions, our estimated impacts of managed care are roughly 15 to 20 percent smaller. We interpret this difference as suggesting that un-modeled, omitted factors are correlated with both the implementation of managed care and utilization in the larger sample; for example, it is possible that utilization trends in urban areas trended differently over time than utilization in rural areas, and the urban areas also adopted managed care.

Finally, we examine the sensitivity of the results to including all children, rather than continuously enrolled children. Recall that we do not observe a child's health insurance status in months where the child is not enrolled in Medicaid and we were concerned that these children may bias the estimates of managed care. If the child had been uninsured prior to entering Medicaid, that child may have pent-up demand for medical services or may only be enrolled in

Medicaid when he or she gets sick. Additionally, our results from the CPS suggest that take-up of Medicaid varies with the implementation of managed care, so the health composition of children is not necessarily the same after managed care is enacted.

VIII. Conclusions

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Table 1: Trends in Kentucky Population and Number of Medicaid Eligible, 1997-2005

Year	POP	Region 3 POP (Passport, 1998 to present)	Region 5 POP (KHS, 1998-1999)	Medicaid Eligible	Region 3 Medicaid (Passport, 1998 to present)	Region 5 Medicaid (KHS, 1998-1999)	Medicaid Managed Care	Medicaid FFS
1997	3,952,747	1,092,766	719,020	531,868	111,790	75,274	0	531,868
1998	3,985,390	1,102,450	730,460	520,704	108,577	72,582	181,159	339,545
1999	4,018,053	1,114,234	741,694	517,748	105,978	71,188	177,166	340,582
2000	4,048,831	1,125,395	810,375	557,067	113,733	78,908	113,733	443,334
2001	4,066,442	1,131,828	800,833	607,571	125,773	88,116	125,773	481,798
2002	4,086,754	1,138,992	789,702	626,729	131,158	91,191	131,158	495,571
2003	4,110,922	1,147,263	779,949	654,066	138,636	96,095	138,636	515,430
2004	4,135,567	1,155,702	771,784	672,238	143,599	99,721	143,599	528,639
2005	4,165,958	1,164,734	763,839	686,600	148,517	103,095	148,517	538,083

Sources: Population estimates are from the Kentucky State Data Center: <http://ksdc.louisville.edu/> and the Medicaid eligible estimates are from the Kentucky Cabinet for Health and Family Services: <http://chfs.ky.gov/dms/stats.htm>

Table 2: Passport and Kentucky Health Select Monthly Capitation Rates

Passport Eligibility Categories	Pre- Managed Care	11/1/1997 - 6/30/1998 FY 1998	7/1/1998 - 12/31/1998 FY 1999
AFDC	N/A	137.00	146.20
Foster Care	N/A	177.38	188.52
SOBRA	N/A	171.02	181.85
SSI with Medicare	N/A	117.00	125.24
SSI without Medicare	N/A	504.65	531.51
SCHIP	N/A	N/A	N/A

KY Health Select Eligibility Categories	Pre- Managed Care	11/1/1997 - 6/30/1998 FY 1998	7/1/1998 - 12/31/1998 FY 1999
AFDC	N/A	124.18	150.39
Foster Care	N/A	166.26	194.52
SOBRA	N/A	160.28	188.67
SSI with Medicare	N/A	143.03	170.16
SSI without Medicare	N/A	382.39	421.14
SCHIP	N/A	N/A	N/A

Source: Bartosch and Haber (2004).

Table 3: Regional Comparisons using the Census

	Region 1	Region 2	Region 3 (Passport)	Region 4	Region 5 (KHS)	Region 6	Region 7	Region 8
Total Pop. 2006	235,062	381,937	1,177,495	472,178	798,843	400,113	249,499	490,947
Average Pop. 2006	19,589	31,828	73,593	23,609	38,040	66,686	17,821	25,839
White, Weighted (%)	90.5	88.0	80.7	92.5	86.9	93.0	96.0	96.9
Living In Same House in 1995 and 2000 (%)	59.5	56.0	54.0	56.9	48.8	53.9	61.7	66.6
High School Graduates 2000 (%)	75.8	74.9	80.0	66.8	77.7	81.4	68.1	58.7
Homeowner Rate 2000 (%)	75.0	71.2	69.9	73.9	64.9	70.3	77.0	76.1
Poverty Rate 2004 (%)	15.6	15.8	13.7	18.9	14.7	10.6	20.0	26.3
Counties	Ballard, Caldwell, Calloway, Carlisle, Crittenden, Fulton, Graves, Hickman, Livingston, Lyon, Marshall, McCracken	Christian, Daviess, Hancock, Henderson, Hopkins, McLean, Muhlenberg, Ohio, Todd, Trigg, Union, Webster	Breckinridge, Bullitt, Carroll, Grayson, Hardin, Henry, Jefferson, Larue, Marion, Meade, Nelson, Oldham, Shelby, Spencer, Trimble, Washington	Adair, Allen, Barren, Butler, Casey, Clinton, Cumberland, Edmonson, Green, Hart, Logan, McCreary, Metcalf, Monroe, Pulaski, Russell, Simpson, Taylor, Warren, Wayne	Anderson, Bourbon, Boyle, Clark, Estill, Fayette, Franklin, Garrard, Harrison, Jackson, Jessamine, Lincoln, Madison, Mercer, Montgomery, Nicholas, Owen, Powell, Rockcastle, Scott, Woodford	Boone, Campbell, Gallatin, Grant, Kenton, Pendleton	Bath, Boyd, Bracken, Carter, Elliott, Fleming, Greenup, Lawrence, Lewis, Mason, Menifee, Morgan, Robertson, Rowan	Bell, Breathitt, Clay, Floyd, Harlan, Johnson, Knott, Knox, Laurel, Lee, Leslie, Letcher, Magoffin, Martin, Owsley, Perry, Pike, Whitley, Wolfe

Source: U.S. Census QuickFacts data for Kentucky: <http://quickfacts.census.gov/qfd/states/21000.html>

Table 4: Final Study County Comparisons using the Census

	Passport Treatment	Passport Control	KHS Treatment	KHS Control	Passport counties sharing a KHS border	KHS counties sharing a Passport border
Total Pop. 2006	77,420	111,850	146,881	252,527	125,763	119,330
Average Pop. 2006	19,355	15,979	16,320	18,038	25,153	29,833
White, Weighted (%)	93.9	95.0	96.5	96.3	89.3	89.0
Living In Same House in 1995 and 2000 (%)	60.7	62.1	58.2	59.6	54.2	53.0
High School Graduates 2000 (%)	67.7	64.6	63.7	63.4	76.9	78.0
Homeowner Rate 2000 (%)	79.1	78.5	75.5	76.6	77.1	70.3
Poverty Rate 2004 (%)	16.7	17.8	19.0	20.6	12.1	12.7
Counties	Breckinridge, Grayson, Larue, Marion	Butler, Edmonson, Green, Hart, Hancock, Ohio, Taylor	Estill, Harrison, Jackson, Lincoln, Montgomery, Nicholas, Owen, Powell, Rockcastle	Bath, Bracken, Clay, Fleming, Gallatin, Grant, Laurel, Lee, Menifee, Owsley, Pendleton, Pulaski, Robertson, Wolfe	Henry, Nelson, Shelby, Spencer, Washington	Anderson, Boyle, Franklin, Mercer

Source: U.S. Census QuickFacts data for Kentucky: <http://quickfacts.census.gov/qfd/states/21000.html>

Table 5: Descriptive Statistics using Kentucky Administrative Data

Variable	Children Initially in a Passport County	Children Initially in a Passport Control County	Children initially in a KHS County	Children initially in a KHS Control County
# children	1,890	2,816	4,273	9,317
# child months	56,700	84,480	128,190	279,510
% switched county at least once	23.92%	25.99%	25.16% ***	20.61%
Demographics:				
Avg. age on Jan 1, 1996 (years)	7.08*	6.84	7.15	7.09
% non-white	11.06%	9.73%	6.48%	5.91%
% female	48.94% **	45.56%	46.71%	47.47%
Avg. number of siblings	0.82	0.83	0.75	0.75
Utilization:				
% with any monthly Medicaid:				
Outpatient Utilization Jan 97- Oct 97	9.84% ***	8.58%	10.40% ***	9.51%
Outpatient Utilization Nov 97- June 99	5.13% ***	7.99%	8.22% ***	8.96%
Professional Utilization Jan 97- Oct 97	37.62% ***	35.12%	32.16% ***	36.12%
Professional Utilization Nov 97- June 99	24.80% ***	34.29%	32.52% ***	35.52%
Inpatient Utilization Jan 97- Oct 97	0.51%	0.60%	0.40% ***	0.54%
Inpatient Utilization Nov 97- June 99	0.26% ***	0.44%	0.32% ***	0.41%

Source: De-identified, linked Medicaid claims and enrollment data provided by the Kentucky Cabinet for Health and Family Services.

Notes: The stars represent the results of tests for difference in means / proportions between the treatment and control counties within each region. *** implies that the difference is statistically significant at the 1% level, ** implies that the difference is statistically significant at the 5% level, and * implies that the difference is statistically significant at the 10% level.

Table 6: Passport First Stage Regression Results

(dependent variable: Monthly HMO Enrollment (0,1))

	First Stage Using Initial County Instrument
HMO_elig_initial_county	0.69 *** 0.002
Month-Year Dummies?	Yes
Child Fixed Effect?	Yes
R - squared overall	0.69
# children	4,706
# child - months	141,180

Source: De-identified, linked Medicaid claims and enrollment data provided by the Kentucky Cabinet for Health and Family Services.

Notes: These regressions also include a post managed care time dummy and monthly controls for child age. Standard Errors are clustered on individual children.

Table 7: Passport Second Stage Results - Instrument Based on Initial County of Residence

(dependent variables: indicators for any monthly professional, outpatient, or inpatient utilization)

	Any OLS (1a)	Prof? IV (1b)	Any OLS (2a)	OP? IV (2b)	Any OLS (3a)	IP? IV (3b)
HMO	-0.16 *** 0.004	-0.17 *** 0.007	-0.06 *** 0.003	-0.06 *** 0.004	-0.001 * 0.001	-0.001 0.001
Month-Year Dummies?	Yes	Yes	Yes	Yes	Yes	Yes
Child Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
<i>Pre-Reform Avg. Monthly Utilization Rate:</i>	36.13%	36.13%	9.09%	9.09%	0.57%	0.57%
<i>Percent Change:</i>	-44%	-47%	-66%	-66%	-18%	-18%
R - squared overall	0.0213	0.0211	0.0059	0.0058	0.0002	0.0002
# children	4,706	4,706	4,706	4,706	4,706	4,706
# child - months	141,180	141,180	141,180	141,180	141,180	141,180

Source: De-identified, linked Medicaid claims and enrollment data provided by the Kentucky Cabinet for Health and Family Services.

Notes: These regressions also include a post managed care time dummy and monthly controls for child age. Standard Errors are clustered on individual children.

Table 8: Kentucky Health Select First Stage Regression Results

(dependent variable: Monthly HMO Enrollment (0,1))

	First Stage Using Initial County Instrument
HMO_elig_initial_county	0.79 *** 0.001
Month-Year Dummies?	Yes
Child Fixed Effect?	Yes
R - squared overall	0.75
# children	13,590
# child - months	407,700

Source: De-identified, linked Medicaid claims and enrollment data provided by the Kentucky Cabinet for Health and Family Services.

Notes: These regressions also include a post managed care time dummy and monthly controls for child age. Standard Errors are clustered on individual children.

Table 9: Kentucky Health Select Second Stage Results - Instrument Based on Initial County of Residence

(dependent variables: indicators for any monthly professional, outpatient, or inpatient utilization)

	Any OLS (4a)	Prof? IV (4b)	Any OLS (3a)	OP? IV (3b)	Any OLS (2a)	IP? IV (2b)
HMO	0.021 *** 0.003	0.012 *** 0.004	-0.016 *** 0.002	-0.021 *** 0.002	0.001 * 0.0004	0.001 0.001
Month-Year Dummies?	Yes	Yes	Yes	Yes	Yes	Yes
Child Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
<i>Pre- Reform Avg. Monthly Utilization Rate:</i>	34.88%	34.88%	9.79%	9.79%	0.50%	0.50%
<i>Percent Change:</i>	6%	3%	-16%	-21%	20%	20%
R - squared overall	0.0082	0.0086	0.0028	0.0026	0.0004	0.0004
# children	13,590	13,590	13,590	13,590	13,590	13,590
# child - months	407,700	407,700	407,700	407,700	407,700	407,700

Source: De-identified, linked Medicaid claims and enrollment data provided by the Kentucky Cabinet for Health and Family Services.

Notes: These regressions also include a post managed care time dummy and monthly controls for child age. Standard Errors are clustered on individual children.

Table 10: CPS Difference-in-Differences Analysis of Changes in Insurance Status

	(1)	(2)	(3)
	Medicaid coverage		
Managed Care Current County (MCCC)	-0.105 (0.030)	-0.164 (0.041)	-0.131 (0.054)
Adjusted R-Squared	0.276	0.278	0.307
	Private coverage		
Managed Care Current County (MCCC)	-0.059 (0.032)	-0.129 (0.044)	-0.145 (0.058)
Adjusted R-Squared	0.358	0.359	0.360
	Uninsured		
Managed Care Current County (MCCC)	0.103 (0.027)	0.162 (0.037)	0.191 (0.052)
Adjusted R-Squared	0.067	0.069	0.058
CPS analytic weights included?	Yes	Yes	Yes
Region*Year Trends?	No	Yes	Yes
Exclude Imputes?	No	No	Yes
# children	3,839	3,839	2,420

Source: March 1997-2003 CPS data.

Notes: Final column is preferred CPS specification. Models include dummies for child's sex, race (white/black/other), dummies for households poverty status (0-100, 100-200, 200-300, 300+), homeownership, region dummies (regions 3, 5, and 7), year dummies (1997-2002), child's age entered linearly, and a constant term. Managed Care Current County (MCCC) is the percentage of children who would be eligible for Medicaid managed care (based solely on region and year; MCCC varies because unidentified MSAs in the CPS include both managed care and non-managed care counties).

Table 11: CPS Difference-in-Difference-in-Differences Analysis of Changes in Insurance Status

	(1)	(2)	(3)
	Medicaid coverage		
Managed Care Current County (MCCC)	-0.344 (0.106)	0.029 (0.042)	-0.012 (0.063)
MCCC*Under 200% FPL	---	---	-0.266 (0.078)
Adjusted R-Squared	0.276	0.278	0.317
	Private coverage		
Managed Care Current County (MCCC)	-0.200 (0.091)	-0.102 (0.076)	-0.149 (0.069)
MCCC*Under 200% FPL	---	---	-0.002 (0.085)
Adjusted R Squared	0.358	0.359	0.360
	Uninsured		
Managed Care Current County (MCCC)	0.375 (0.090)	0.055 (0.058)	0.182 (0.042)
MCCC*Under 200% FPL	---	---	0.291 (0.064)
Adjusted R Squared	0.067	0.069	0.070

Income Group	Under 200% of FPL	Over 200% of FPL	Full sample
CPS analytic weights included?	Yes	Yes	Yes
Region*Year Trends?	Yes	Yes	Yes
Exclude Imputes?	Yes	Yes	Yes
# children	1,191	1,229	2,420

Source: March 1997-2003 CPS data.

Notes: Models include dummies for child's sex, race (white/black/other), dummies for households poverty status (0-100, 100-200, 200-300, 300+), homeownership, region dummies (regions 3, 5, and 7), year dummies (1997-2002), child's age entered linearly, and a constant term. Managed Care Current County (MCCC) is the percentage of children who would be eligible for Medicaid managed care (based solely on region and year; MCCC varies because unidentified MSAs in the CPS include both managed care and non-managed care counties). The final column (the true DDD specification) includes interactions of poverty level and MCCC, poverty level and year, and poverty level and region.

Table 12: Specification Checks

Model:	sample size	specification	Any Prof?	Any OP?	Any IP?
Passport (from Table 7)	4,706	IV	-0.17 *** 0.007	-0.06 *** 0.004	-0.001 0.001
KHS (from Table 9)	13,590	IV	0.012 *** 0.004	-0.021 *** 0.002	0.001 0.001
Combined Regions	18,296	IV	-0.040 *** 0.003	-0.032 *** 0.002	0.0001 0.0005
All Counties, Combined Regions	101,649	IV	-0.051 *** 0.001	-0.027 *** 0.001	0.0004 * 0.000
Short Spells, All Counties, Combined Regions?					

Pre-Reform Passport Avg Util rate:

36.13%

9.09%

0.57%

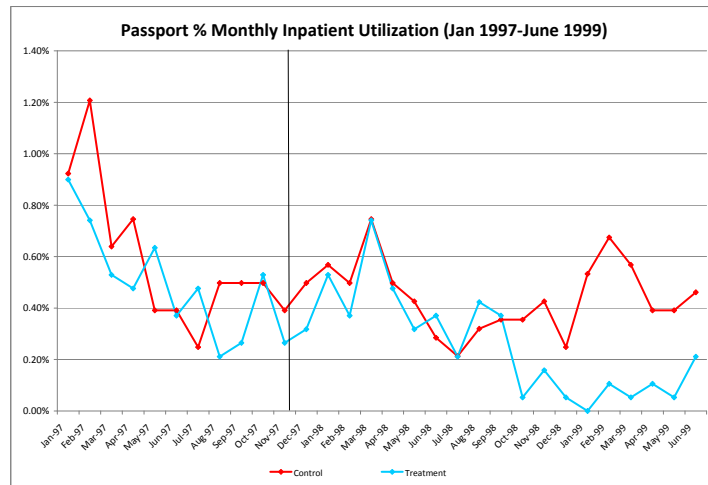
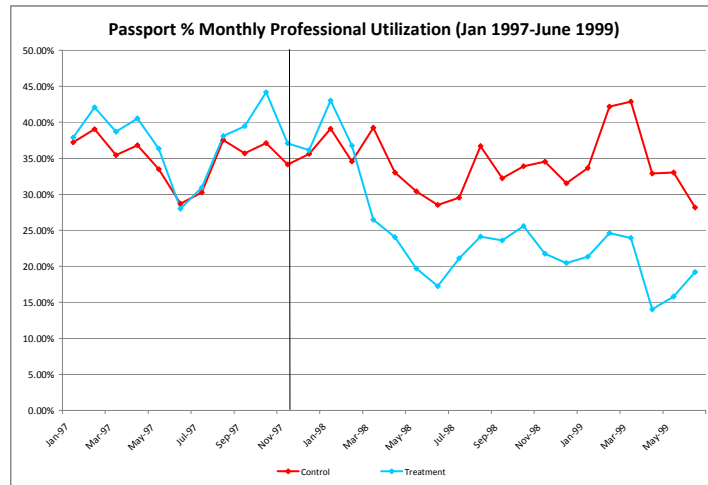
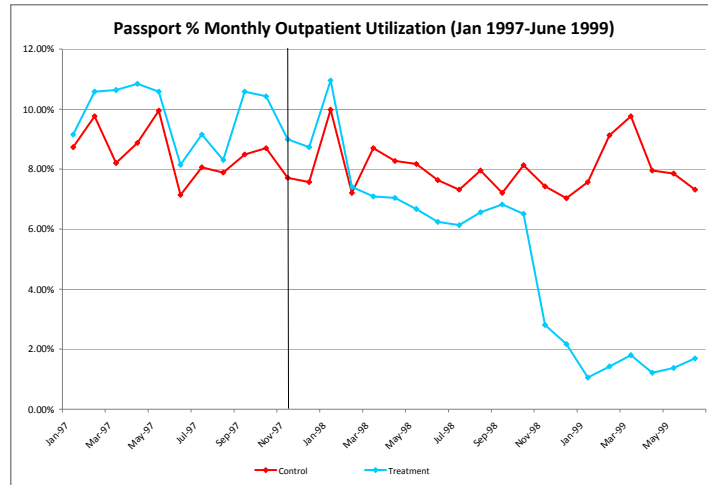
Pre-Reform KHS Avg Util rate:

34.88%

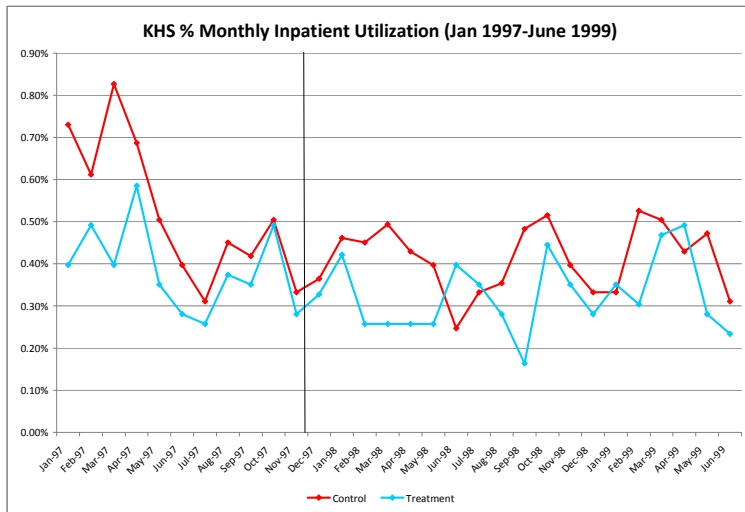
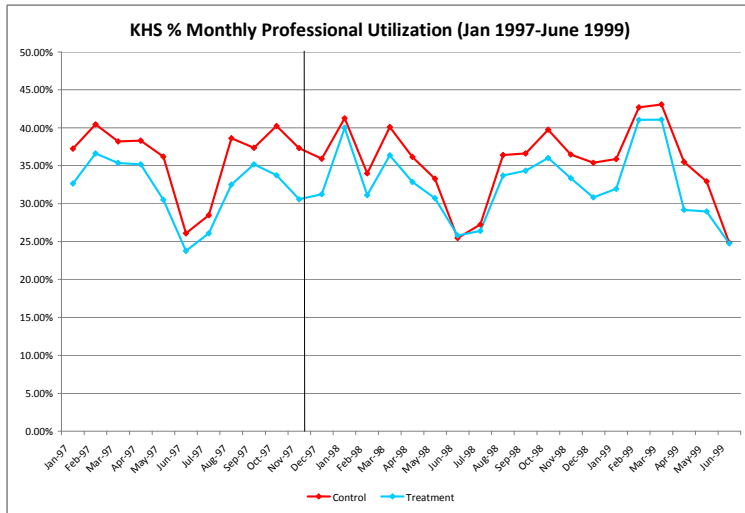
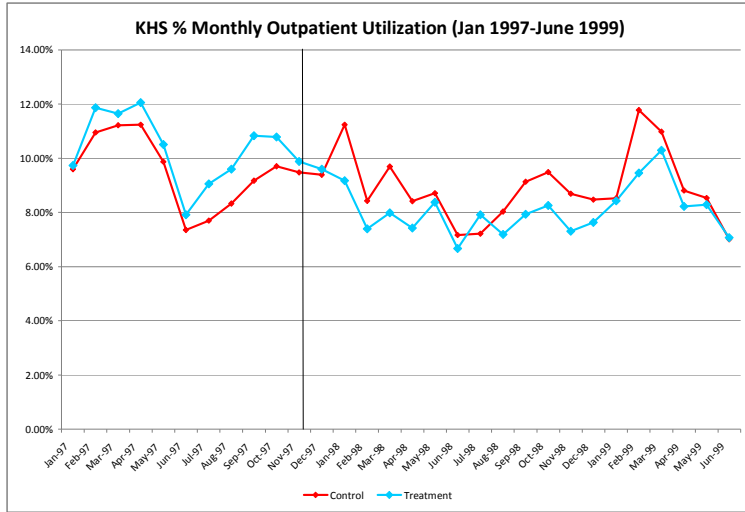
9.79%

0.50%

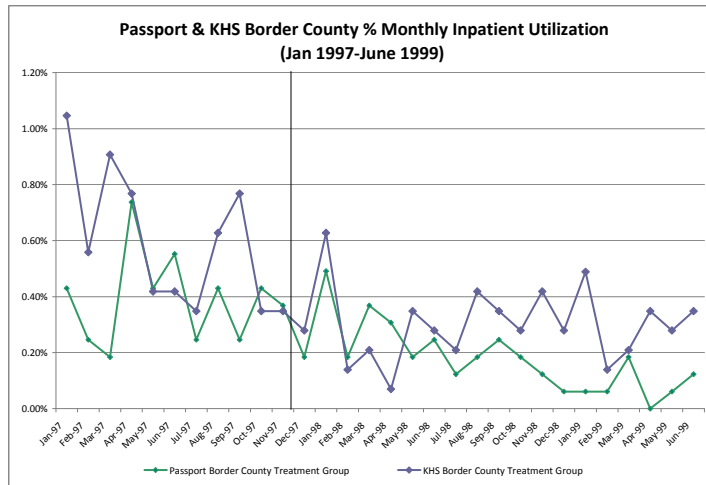
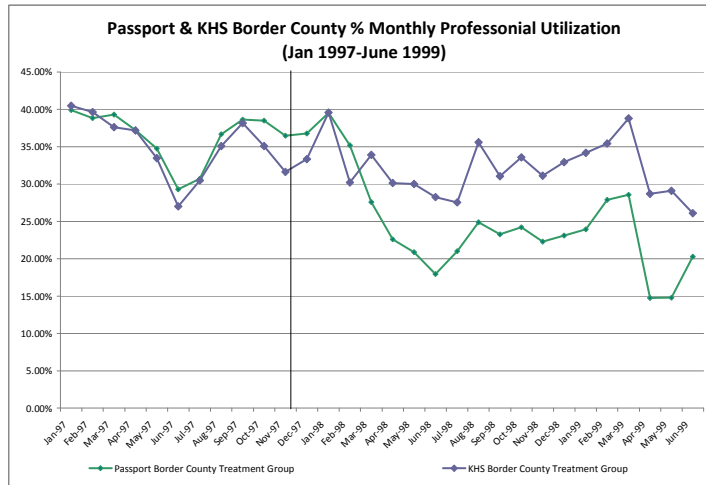
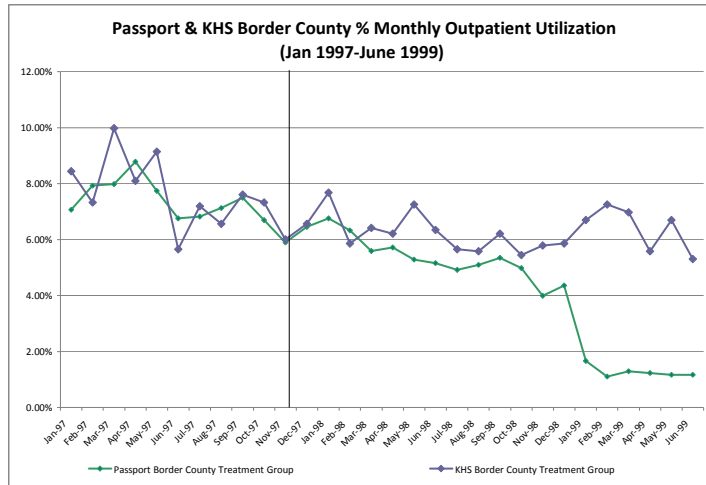
Figures 3a, 3b, 3c: Passport Utilization



Figures 4a, 4b, 4c: Kentucky Health Select Utilization



Figures 5a, 5b, 5c: Comparing Passport and KHS Counties that Share Common Borders



Appendix Table 1: Services Covered by the State Capitation Payments to the Plans

Capitated	Services	Excluded Services
Inpatient Hospital Services	Dental Services	Mental Hospitals
Outpatient Hospital Services	Medical Transportation	Psychiatrists
Urgent and Emergency Services	EPSDT Services	Psychiatric Beds (Inpatient Hospital)
Outpatient Surgical Services	Vision Care	Non-Emergency Transportation (Mental Health)
Medical services provided by:	Preventive Health Services provided by:	AIS/MR Services
Physicians	Public Health Departments	ICF/MR
Advanced Practice RNs	FQHCs	Targeted Case Management (Behavioral Health)
Physician Assistants	Rural Health Centers	Home and Community-Based Waiver Services
FQHCs	Hearing Services (under age 21)	Certain Medicare-Only Services:
Primary Care Centers	Durable Medical Equipment	CORF Services
Rural Health Clinics	Alternative Birthing Services	Chiropractors
Laboratory	Podiatry Services	Physicians Assistant
X-rays	Family Planning Clinic Services	Physical and Occupational Therapy
Appropriate Escort Meals and Lodging	Renal Dialysis	Psychologist
Therapeutic Evaluation and Treatment:	Hospice Services	Clinical Social Worker
Physical Therapy	Organ Transplant Services	Nursing Facility Services
Speech Therapy	Specialized Case Management for Children and Adults with Complex Conditions	EPSDT Special Services (Behavioral Health)
Occupational Therapy	Behavioral Health (Limited to PCP)	School-Based Services for Disabled Students
Home Health Services	Medical Detoxification	Early Intervention Services for Infants and Toddlers with Disabilities
Pharmacy and Limited OTC Drugs		

Source: Bartosch and Haber (2004).