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Catherine Haeck, Pierre Lefebvre, Philip Merrigan, and David Lapierre

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Evidence on maternal health from two large Canadian parental leave expansions: When is Enough Too Much?

Catherine Haeck, haeck.catherine@uqam.ca
Pierre Lefebvre, lefebvre.pierre@uqam.ca
Philip Merrigan, merrigan.philip@uqam.ca
David Lapierre, lapierre.d.la@gmail.com

Department of Economics, Université du Québec à Montréal
P.O. 8888, Box "A", Montreal, QC, Canada, H3C 3P8

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Abstract
Exploiting unique administrative longitudinal data sets on medical services provided to mothers before- and after- delivery, we estimate the causal effects of two major distinct parental leave reforms on maternal health outcomes, over a period of 5 years postpartum. The health outcomes are objective measures based on all types of medical services provided by physicians. For mothers publicly insured by the public prescription drug plan we can also identify all drugs used, in particular those associated with depressive symptoms. The long time span of the longitudinal administrative data sets allows an assessment of short-run and long-run effects of maternity leave on mothers' health. The empirical approach uses a strict regression discontinuity design based on the day of regime change. The large samples of mothers, who gave birth three months before and three months after the two policy changes (in 2001 and 2006), are drawn randomly from the population of delivering women, all covered by the universal public health care program. We do not find any evidence that the reforms had sizeable impacts on maternal health care costs, either of a physical or of a mental in nature, as measured by physicians' fee-for-service billing costs, prescription drug costs, or the number of hospitalizations. The second expansion has given rise to large fiscal costs over time as well as socioeconomic inequities.

Keywords: maternal leave, longitudinal data, physical mental health acts, costs, prescription drugs, regression-discontinuity design, parametric, non-parametric

JEL Classification: C14, C81, H41, I12, I13, I18

Corresponding author: Philip Merrigan, merrigan.philip@uqam.ca

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1. Introduction

The widespread increase in women's labor force participation in the seventies and eighties during childbearing years has lead most developed countries to adopt national maternity leave policies to support parents in their efforts to care for newborn children while remaining attached to the labor market.[1] Within the European Union, since the 1990s, a minimum of 3 months of parental leave is mandatory, and there is a binding guideline for at least 14 weeks of paid maternity leave.[2] Governments generally provide two types of support for the parents of infants: protected job leave and publicly provided financial support (for both maternity and paternity leave). Of course, these provisions and guidelines have led to heterogeneous parental leave policies in the developed world. Across countries, there are wide variations in the duration of job protection and direct financial support, with complex systems of fully-paid, partially-paid, and unpaid leave (Ray, Gornick, and Schmitt, 2009).[3]

Moreover, in a few cases, regional policies differ significantly within a given country. For example, in Canada, parental leave job-protection is legislated at the provincial level. Hence, the resulting guarantees in this country vary widely over time (Baker and Milligan, 2008b), from modest beginnings in the 1970s (17-18 weeks of protected leave) to a widespread expansion in 2000 (52 weeks in most provinces and up to 70 weeks in the Province of Québec). With regards to parental leave benefits, the Canadian Federal government initiated a national program in 1971. After several years of negotiations, the Province of Québec opted out of the federal program in January 2006 and implemented its own parental leave policy with extended coverage and higher benefits (compared to the previous federal program). Québec is the only Canadian province with its own parental leave policy. In contrast, the United States has no national legislation for paid parental leave, but several states have established social insurance schemes to support parents with newborns.[4]

Although one of the fundamental objectives of parental leave policies is the enhancement of maternal and child health and well-being, there is limited evidence on links between such policies and

[1] In Canada, maternity benefits as part of the federal unemployment insurance program were introduced in 1971.
[2] According to the OECD Family database, the median number of paid weeks of leave among OECD countries had risen from 14 in 1980 to 42 by 2001.
[3] Most of the national policies for 21 high-income economies reviewed by Ray et al. (2009), as of June 2008, provide between three months and one year of full-time-equivalent paid leave; Sweden, the most generous of the countries examined, provides 40 weeks of full-time-equivalent paid leave. The United States is one of only two countries to offer no paid parental leave. Australia also offers no paid leave, but supports new parents with a substantial financial "baby bonus" regardless of their parental leave decision.
[4] New parents in the United States may access leave through the Family Medical Leave Act (FMLA) of 1993. FMLA leave consists of 12 weeks of unpaid leave with health coverage that must be taken continuously and on a full-time basis, if employed by a firm with more than 50 workers. In addition, more or less 28 states offer partially-paid disability leave for new parents.

maternal health outcomes, in particular on the effects of increased leave duration and the enhancement of benefit levels. Nevertheless, several studies using cross-sectional, longitudinal or cross-country data were conducted evaluating the links between the length of maternity leave and child health as well as breastfeeding, where the length of the leave is in most cases defined as the number of out-of-work weeks following childbirth (few studies distinguishing paid from unpaid leaves).[5] The benefits of parental leave on child health and development has proved particularly difficult to demonstrate given the number of potential influences and the extended time period necessary for meaningful assessment (Baker and Milligan, 2012; Haeck, 2015; Brook-Gunn, Han, and Waldfogel, 2010). Results on the impact of maternal leave on children's physical health have been mixed with regards to the association between leave and infant mortality, birth weight and premature birth, breastfeeding incidence and duration (Ruhm, 2000; Rossin, 2012; Tanaka, 2005; Baker and Milligan, 2008a).

A handful of studies in economics have investigated the short- and long-term impacts of leave duration on maternal health and well-being. A number of micro-data studies (mainly from the United States) have been conducted over the past decade. They are based on surveys of mothers who worked during their pregnancy and returned to work a few months after childbirth. The results show that longer leaves are related to statistically significant reductions in depressive symptoms and parental stress, as well as a higher prevalence and duration of breastfeeding (recognized both as conducive to maternal and child health). However, in most studies, maternal measures of health, whether physical or mental (such as the incidence of depressive symptoms pre- and postpartum) as well as vitality and role function, are self-assessed (e.g. for the United States, see Chatterji et al., 2013, 2012, 2011, 2008, 2005; for Canada, see Baker and Milligan, 2010, 2008b, 2008b;). These studies bring considerable value to the literature, but it remains an open question whether improved self-reported health translates into a reduced demand in medical services and cost savings.

More recent European studies (reviewed below) have used plausibly exogenous policy changes (for example, longer periods of entitlements, or an expansion of paid and unpaid leave) to identify the effects of maternity leave policy on the health outcomes of mothers and their children. Context matters for the estimated effects of the policy, such as a setting where governments provide universal health insurance, which is the case in Sweden, Norway.

Here, in the Canadian context of "a single payer universal health insurance policy", we estimate the causal effects of two different expansions of maternity leave policies on the health of mothers.

[5] For surveys see Staehelin, Bertea, and Stutz, 2007; Tanaka, 2005.

The first, a substantive expansion implemented on January 1st 2001 added 25 weeks of paid parental leave (to a program already offering 15 weeks of maternity leave and 10 weeks of parental leave). These additional weeks could be split up between the mother and the father and effectively provide a total potential entitlement of 50 weeks of leave and benefits to mothers giving birth. The second policy reform, implemented only in the Province of Québec as of January 1st, 2006, resulted in higher replacement ratios of pre-birth earnings, increased insurable earnings, relaxed eligibility rules, and paternal leave (leave specific to fathers).

Exploiting unique administrative data sets extracted from the 'Régie de l'assurance maladie du Québec' (RAMQ)[6] Medical Registers of all billable medical acts provided to a large random sample of mothers giving birth before and after the policy changes, we estimate the impact of both policies on maternal health outcomes as measured by physician costs using a regression discontinuity design (RD) applied with novel econometric techniques developed by Calonico, Cattaneo, and Titiunik (CCT, 2014).

The Province of Québec provides universal health insurance to all its citizens by way of the Medical Insurance Act, a provincial legislation highly constrained by federal laws. Practically all physicians (specialists or generalists) practice medicine within the confines of this legislation. If they wish to practice privately, and very few do so, then they cannot practice within the public system. When a physician renders services to a patient covered by public insurance, he will bill the RAMQ for each service that he undertakes. The fee for each type of service is negotiated with the government by national medical boards representing either generalists or specialists. We obtained from the RAMQ invoices from physicians that include details of each service rendered to the patient and the corresponding fee. The actual amounts paid to the physicians are almost the same as the amounts requested on the invoices. Some physicians within the public system do not work within the fee per service framework. We do not have access to any micro costs related to such services. However, the vast majority provided by physicians are billed as fee per service amounts. Some services are provided in private clinics, but bills for medical acts are forwarded to the RAMQ for payment to physicians.

Moreover, in Québec, since 1997, every citizen must be covered by prescription drug insurance. Some are covered by a private plan, i.e. a group insurance or employee benefit plan offering basic coverage for prescription drugs. These plans are usually available through employment, in the form of

[6] Québec's health insurance authority, the 'Régie de l'assurance maladie du Québec' (RAMQ), created in 1971, became the sole public agency authorized by the government to pay for services provided by physicians participating in the public system. The RAMQ pays directly to physicians for the medical services they give to patients.

a group insurance, which an employer may offer or not to its employees as a fringe benefit. Citizens who are not covered by for private plan must register (by law) for the Public Prescription Drug Insurance Plan (PPDIP). The RAMQ also provided us with the PPDIP Registers for mothers insured by the Plan at the time of delivery containing data on purchases of prescription drugs covered by the plan.

For this study, we asked the RAMQ to randomly select from the administrative files two groups of mothers: (1) mothers who gave birth from October 2000 to March 2001, three months before and after the changes in maternity leave legislation in Canada; and (2) mothers who gave birth between October 2005 and March 2006, again three months before and after the start of Québec's new maternity leave program, exclusive to this province.

These samples of mothers enable us to adopt a strict RD approach to estimate the impacts of the reforms. This evaluation method is now very well established in the empirical literature (e.g. van der Klaauw, 2008; Lee and Lemieux, 2010). In all, we observe 36,000 mothers equally divided (18,000) in the two groups, for the 2001 and 2006 reforms respectively. On a monthly basis, they represent approximately between 50 and 60 percent of all mothers giving birth in the province, according to the Québec Monthly National Registry of Births. The RAMQ extracted from the medical registries all the medical services provided by physicians to these mothers and billed to the RAMQ two years before giving birth and up to five years following this same birth. In total, we observe 2.9 million medical services over the seven-year time-span (1.419 and 1.466 million respectively for the two groups). A diverse number of variables are available for each service: costs (that is payments to physicians) to the RAMQ, type of service (for example: psychiatric, surgical, or technical service), related diagnostics (e.g. natural birth, caesarean birth, multiple birth, birth complications, depressive disorders, anxiety disorders, hypothyroidism, etc.), site of treatment (e.g. outpatient in physicians' offices or hospitals, inpatient in hospitals or emergency rooms, and laboratories), and the date for each service. The prescription drug records provide the pharmacological-therapeutic reason for the drug as well as total cost and net cost of each prescription (netting out co-insurance and co-payments). We also observe the age of the mothers by category as well as their region of residence.

Our study adds to the scarce economic literature that estimates maternal leave impacts on maternal health with unique contributions: (1) we examine the health effects of maternal leave expansions with large samples of mothers (36,000 mothers) who gave birth shortly before and after two large-scale reforms; (2) all mothers are covered by a universal public health care single payer system; (3) the health outcomes are objective measures based on services dispensed by physicians and provided by the universal health insurance plan in Québec as well as the diagnostics associated to these services;

(4) for mothers publicly insured by the public prescription drug plan we can identify all drugs purchased, in particular those associated with depressive symptoms; (5) the long time span of the longitudinal administrative data sets with mothers' medical records allows us to discriminate between potential short-run and long-run effects of maternity leave extensions; (6) the empirical approach uses a rather stringent RD design based on the day of delivery and the novel methods in CCT (2014).

The rest of the paper is structured as follows. Section 2 presents the institutional setting and reforms in Canada with regards to maternal leave policy. Section 3 reviews previous empirical findings on health-related benefits of maternal leave. Section 4 explains the empirical approach and identification strategy. Section 5 describes the data sets used, sample characteristics and descriptive statistics. Section 6 displays the estimated effects of the policy and their interpretation. Section 7 presents a brief discussion of the policy in the context of the results. Section 8 concludes the paper.

2. Institutional setting and parental leave reforms in Canada

The Canadian Employment Insurance Maternity and Parental Benefits Program (CEIP)[7]

In Canada, maternity benefits were introduced in 1971 as part of the federal Unemployment Insurance (UI) program. To be eligible, mothers were required to accumulate 20 weeks of insurable employment during the year before giving birth (i.e. weeks with at least 15 hours of paid work and wages that amounted to at least 20 percent of the maximum insurable earnings determined by law). Eligible mothers were entitled to 15 consecutive weeks of benefits following a 2-week waiting period. Benefits were paid at two-thirds the level of past wages, up to a maximum of $150 per week (in 1971 dollars); 8 weeks prior to the expected week of delivery and 6 weeks afterward (8 + 1 + 6). Two decades later, in 1990, 10 weeks of parental leave benefits were added with a 60% replacement rate for both maternity and parental benefits with a ceiling for insurable earnings. Biological fathers and mothers were allowed to share the 10 weeks of parental benefits (both had to serve a 2-week waiting period before receiving benefits). In 1994, the replacement rate was reduced to 55 percent; claimants with low wages (less than 50 percent of maximum insurable earnings) became eligible for a special "dependency replacement rate" of 60 percent. In 1997, "Employment Insurance" (EI) replaced UI with eligibility requirements changing from 20 weeks of paid work to 700 hours of paid work. More significant changes were implemented in December 2000 (see Box 1) for the mothers of children born or adopted after December 31st: parental leave benefits were increased from 10 to 35 weeks (the topic of our first analysis), potentially increasing the total maternity leave time from six

[7] We draw from Phipps (2006) for the description of policy changes in maternal benefits over the last decades.

months to 50 weeks (considering a 2 weeks waiting period, not applicable in Québec as of 1994). The waiting period was reduced to 1 week for parents who shared weeks of parental leave. The threshold for eligibility was lowered from 700 to 600 hours of insurable employment. The replacement rate remained unchanged at 55% of pre-birth weekly insurable earnings. From 1996 to 2006, insurable earnings remained capped at $39,000 nominally.

Parental leave job-protection legislation is a provincial prerogative in Canada. In the 1970s and 1980s the policy was rather stringent but considerably slackened over the years (to 52 weeks in almost all provinces at the end of year 2000, with a phasing in of the 2001 federal leave expansion). Box 1 presents the main parameters of parental leave programs in Canada.

The Québec Parental Insurance Program (QPIP)

In March 2005, the province of Québec opted out of the federal parental benefits program. The federal government estimated the part of total payroll tax in the EI program used to finance the leave program and Québec's wage earners and employers were accordingly given a rebate on EI premiums. Québec began its own Parental Insurance Program (QPIP), for mothers and fathers of a child born or adopted as of January 1st, 2006. In this plan, parents choose between two options (see Box 1).

The basic plan includes 18 weeks of maternity leave and benefits, as well as 32 weeks of parental leave and benefits, which can be taken by either parent. The 18 initial weeks of maternity benefits are valued at 70 percent of previous earnings, 7 weeks of parental benefits are available with a 70 percent replacement rate and an additional 25 weeks of benefits are offered at a 55 percent replacement rate which can be divided between both parents.[8]

The second option offers a shorter leave but higher replacement rates: mothers are entitled to 15 weeks of maternity benefits with a 75 percent replacement rate and 25 weeks of parental benefits also valued at 75 percent of earnings which can be split between mothers and fathers. The program also offers two paternity benefit plans which are exclusive to fathers: a 5 weeks paid leave with a 70 percent replacement rate; or a 3 weeks leave with a 75 percent rate.

The new regime (compared to the federal plan) increased maximum insurable earnings, from $39,000 to $57,000 in 2006. Since then, the QPIP insurable earnings have increased every year thereby benefiting parents with higher earnings. The replacement rate of 75 percent under the shorter plan (option 2) is considerably higher than the CEIP rate in the other provinces (55 percent) but this plan offers 43 weeks of benefits for mother and father combined, compared to 50 weeks under CEIP. The basic plan also offers higher replacement rates than the CEIP during the first part of the leave (70

[8] All plans have a capped amount of maternity or parental leave benefits.

percent) but the same replacement rates as CEIP during the second part (55 percent). The total duration of benefits for mother and father combined is slightly higher in the Québec plan (55 weeks compared with 50 weeks under CEIP). Like the CEIP, both Québec plans offer a higher replacement rate for lower-income families (actually the same as the CEIP). Eligibility for benefits in Quebec is based on earnings of at least $2,000 in the year prior to the birth (or adoption) of the child, therefore much less stringent criteria. The Québec plan covers self-employed individuals (not covered by the CEIP) as well, and the shorter qualifying period increases the number of families eligible for the program. At the minimum wage in Québec effective on May 1st, 2005 - $7.65 - 258 hours of work were needed to be eligible for benefits under the Québec plan, considerably less than the 600 hours required in 2005 to be eligible for the CEIP.[9]

Statistics on the take-up rate of benefits and women's return to paid work after childbirth: 2000-2012

The unconditional probability that mothers receive maternity benefits increased from only 5 percent in 1971, when they were introduced, to 60 percent by 2003. Maternity benefit coverage per live birth remained relatively constant through the 1990s, despite the introduction of parental benefits. However, maternity claims per live birth appear to have jumped, from the moment duration of parental leave was lengthened and the reduction of hours required for eligibility (from 700 to 600) decreased in 2001, from around 50 percent during the 1990s to 60 percent in the 2000s. The 25-week extension of benefits was extremely well publicized, female labor force participation was higher and, of course, the total parental leave package became more attractive (Marshall 2003; Perusse 2003).

Using Canadian data, Marshall (1999) and Phipps (2000) both find that women who are not entitled to benefits return to paid work much more rapidly than women who are eligible for such benefits. Women who do not receive benefits are more likely than those who are eligible to return to paid jobs within six weeks of giving birth (Marshall); the most common pattern among women who qualify is to return to paid work at or around the time the benefit period ends (Phipps). Whether or not a woman is eligible for maternity benefits clearly affects the labor market behavior of women who have recently given birth. Phipps (2000) finds no evidence that women adjusted their labor supply behavior in order to gain access to parental benefits or changed their fertility behavior in response to the availability of benefits. After the extension of parental benefits from 10 to 35 weeks, employed mothers receiving benefits increased (or planned to increase) their time away from work from 6 months on average in 2000 to 10 months in 2001 (Marshall 2003; Perusse 2003). One quarter of all

[9] Employees and employers (self-employment workers assume both parts) must pay higher insurance premiums to finance Québec's parental leave program, even considering the reduction in the federal employment insurance premiums granted to contributors to the Québec plan. Premiums have increased each year since the implementation of the program.

mothers with benefits in 2001 was back to work within 8 months. These women were more likely to be observed with a temporary or low-paying job, or with a spouse who claimed parental benefits. Average time away from work for mothers who did not receive maternity or parental benefits and returned to work remained at four months in 2001. More mothers giving birth received maternity or parental benefits in 2001 than in 2000 (61% versus 54%)—possibly because of the reduced number of hours required for benefits since labor force participation prior to birth increased only from 74% to 77%. Following the extension of parental benefits, fathers' participation in the program jumped from 3% in 2000 to 10% in 2001.

Using Statistics Canada National Longitudinal Survey of Children and Youth, Hanratty and Trzcinski (2009) estimate the effect of the 2001 expansion of Canadian paid family leave from 25 to 50 weeks on maternal employment and transfers. Their results show that the expansion was associated with an 11 percentage point (23%) increase in the time mothers took off before returning to work but did not change the rate of employment for mothers of young children.

Computed with micro-data from Statistics Canada's Employment Insurance Coverage Survey (EICS)[10] conducted yearly from 2000 to 2012, Figures 1A and 1B show respectively for Québec and the other provinces (Rest of Canada) the evolution of the percentage of mothers with a child aged 0 to 12 months who received maternity or parental benefits (in the birth year of the child). The percentages have largely increased concomitantly with the two policy changes. For Québec, the percentage for year 2012 is rather large but imprecise (because the small sample size of only around 120 mothers, compared to more than 500 for the Rest of Canada).

In 2000 and 2001, the percentage of mothers receiving paid maternity and parental leave benefits among previously employed mothers in Québec increased from 52% to 55%. For the Rest of Canada, we observe a similar jump, from 55% to 60% with the federal expansion. The figures also display statistics for three other groups of mothers: (1) mothers with insurable employment but no EI benefits; (2) mothers who have worked within the last 2 years but with no insurable employment; (3) mothers who have not worked in the last two years. We notice small decreases of (1) and (2) since 2001, especially for the Rest of Canada.

Following the 2006 policy reform in Québec, we observe an increase in the percentage of mothers receiving benefits. According to QPIP administrative data, in 2006, 80% of the 82,000 mothers giving

[10] This survey was launched in 1997, primarily in response to a need for a better understanding of the relationship between the number of persons receiving of Employment Insurance (EI) benefits and the number of unemployed as reported by the Labour Force Survey. The scope of the survey was broadened in 2000 to cover the access to maternity and parental benefits. These changes were implemented one year before the expansion of the parental benefits program in January 2001.

birth received benefits from the new plan (see Table 10 below). Approximately 76% of the parental benefits were paid under the basic plan. Self-employed mothers or fathers represented only 4% of families receiving benefits (a little more than half chose the shorter plan with higher replacement rates). In the Rest of Canada, we also observe an increase in the percentage of mothers receiving benefits in 2001, but not in 2006, as would be expected.

Figures 2A and 2B document the proportion of mothers grouped by leave duration (we aggregate mothers who report duration of leave with mothers with an unfinished leave, who report expected duration). In both Québec and the Rest of Canada, we observe a sharp difference in the behavior of mothers in 2001 versus 2000. The fraction of mothers with leaves of 9 to 12 months increases from around 10% in 2000 to more than 40% in 2002. This change is mirrored by a sharp decline in the percentage of mothers with 5 to 8 months of leave. With the QPIP implementation (2006), depending on years, we observe small increases in the 9 to 12 months duration category from 60% to 70%. Haeck et al. (2015) using survey data on children also find that the time mothers spent at home did not change significantly following the introduction of the QPIP program. For the Rest of Canada, after 2001, there are no significant changes in the evolution of percentages in each duration category, although a larger proportion of mothers plan to leave the labor market for more than one year (data not shown).

3. Empirical findings on the link between maternal health and parental leave

There is no question that pregnancy and childbirth are challenging human experiences both for mothers and their family. There has been a large increase in labor force participation over the past decades of pregnant women and mothers with infants and this makes childbearing and rearing even more difficult. A large proportion of women become pregnant while employed, continue working late into their pregnancy, and then return to work early after giving birth. Given this reality, public policy presumes that increasing affordability and accessibility of maternal (and parental) leave and job-protection can improve the health of pregnant women, newborns, infants, fathers, and mothers of newborn. Time off work, job-protection, and benefits may reduce stress and enhance well-being during the postpartum period.

A growing number of studies have used plausibly exogenous policy changes to focus on children's outcomes in relation with maternal employment during the child's first year with mixed results. Short reforms and reforms impacting maternal behavior beyond the child's first year, for example, reforms of relatively generous leave policies, (Dahl et al, 2013; Milligan, 2010, 2012, 2015; Rasmussen, 2010; Dustmann and Shönberg, 2012) typically find no impacts on children's outcomes, while

policies introduced in a context where none is present produce positive impacts (Carneiro, Loken, and Salvanes, 2015; Danzer and Lavy, 2013), conditional on mothers' education level. While maternity and parental leave do not necessarily lead to increased initiation and duration of breast-feeding, at least they offer women the choice, given the well-documented health benefits for infants (Baker and Milligan, 2008a). Breast-feeding has also potential benefits for the mother such as weight loss, reduced prevalence in type-2 diabetes and cancer, and better postpartum mental health.

Studies estimating the effects of maternal leave on mothers' health and well-being are more limited in number, in particular in economics. Few studies have analyzed the association between extended leave policies and mothers' health outcomes in a context similar to a natural experiment. In Denmark, where the number of weeks with full benefit compensation increased from 28 to 50 weeks for mothers who gave birth on March 27th, 2002 or after, Humlum and Vejlin (2012), using administrative data sets and an instrumental variable method coupled with an RD design, find no effects of the policy change on the mother's probability to be hospitalized with a depression, and on mothers' use of anti-depressants, but small negative effects on the number of hospitalizations. In Germany, based on various administrative data sets and a regression-discontinuity (RD) design, Guertzen and Hank (2013) results suggest significant changes in mothers' return to work behavior because of increased leave, but no convincing evidence for effects on health as identified by the number and length of absenteeism spells at work.

Baker and Milligan (2008a, 2008b) analyze the Federal 2001 reform, with a substantial expansion of leave duration studied in this paper, and find that extended maternity leave (job-protection and benefits duration) increased the period of time before mothers return to work, as well as breast-feeding initiation and duration among those eligible for leave. But the estimated effects of this policy reform on outcomes such as mothers' postpartum depression or self-rated health up to 2 years after birth were found to be not statistically significant. These Canadian studies suggest that extensions beyond a relatively generous entitlement (25 weeks in Canada prior to and 50 weeks after the change) may have limited measurable impact on health outcomes. One shortcoming of the Baker and Milligan studies is that health outcomes are self-reported by the mothers. The same authors also write that an RD design, which they do not use, is better suited for estimating the impact of this policy, the chosen design in this paper.

Time off from work for mothers after birth, according to the medical literature, is associated with improved postpartum health with positive effects on vitality and role function, smaller rates of respiratory infections, breast disease symptoms, and gynecological problems. In almost all studies with a measure of depression, frequency of depressive symptoms declines for postpartum mothers

with the length of maternal leave, in cases for which the window of eligible weeks increases from 6-8 weeks to 12 weeks or more (see studies by Chatterji et al.). However, Baker and Milligan (2008a, 2008b) do not find any such evidence for the impact of longer leave duration on the self-reported health status of mothers in their study of the Canadian 2001 reform**.**

On the other hand, several studies in the medical literature have found that in developed countries, 10 to 15% of mothers with a newborn are diagnosed with a major postpartum depression (O'Hara and Swain, 1996). Postpartum depression (PPD) refers to a non-psychotic depressive episode that begins in or extends into the postpartum period. PPD can evolve from a pre-existing case of the 'baby blues', or can become apparent following the first weeks after delivery and can last as long as 14 months (Goodman, 2005). Although a multitude of treatment options for PPD exist, the most common is a pharmaceutical intervention (Leitch, 2002). An analysis based on 6,421 Canadian women, who gave birth between 2005 and 2006 and were part of the Maternity Experience Survey (MES),[11] was performed in 2011 (Lanes, Kuk and Tamim, 2011). PPD symptoms were measured with the Edinburgh Postnatal Depression Scale (Dennis, 2004). The national prevalence of minor and major PPDs was found to be 8.5% and 8.7% respectively (total prevalence, minor and major, was 17.2%), and in Québec, 7.7% and 9.1% (total of 16.8%). A mother's stress level during pregnancy, the availability of support after pregnancy, and a prior diagnosis of depression were the characteristics that had the strongest statistically significant association with the development of PPDs. A prior diagnosis of depression or past use of prescription antidepressants were also associated with higher odds of experiencing both minor/major and major PPDs. Therefore, our analysis will be particularly interested in medical costs related to mental health.

Possible biases in Lanes et al. are related to self-reporting, partially retrospective answers and the recruitment of participants in surveys. In several studies, the surveyed population is not representative of the female population giving birth and in some cases only mothers who returned to work after maternity leave were included in the sample. Further methodological problems relate to insufficient controls for maternal education or pre-partum health status. Some of the information is rather ancient, being collected in the late 1980s or early 1990s or 2000s (e.g. Chatterji et al.).

The pathways from parental leave to health are diverse: mothers need time to recuperate, from fatigue and exhaustion, after pregnancy and delivery of a child; complications from pregnancy and

[11] It was designed by the Maternity Experiences Study Group of the Canadian Perinatal Surveillance System, and sponsored by the Public Health Agency of Canada. The survey was conducted by Statistics Canada between October 23, 2006 and January 31, 2007. A total of 8,542 Canadian women were selected, out of which 6,421 responded to the survey. The sampling period ranged from 5 to 14 months postpartum, which ultimately garnered conservative minor/major and major PPDs prevalence rates.

delivery may require them to be hospitalized before and after delivery. Additionally, the impact of leave is intensified for parents and infants who have serious medical complications and health conditions related to pregnancy and delivery. The institutional public health context is certainly an important factor that conditions maternal health pathways. Finally, the idea of returning to work can also be stressful when the new born is very young.

The evaluation we conduct, based on representative large random samples of women who gave birth, before and after a significant change in maternal leave policies, and who had access to completely free medical services (before and after delivery) overcomes some shortcomings of data from surveys such as self- reporting or retrospective answers. Moreover, the use of administrative medical records for these mothers over a long period (7 years), as well as the PPDIP records for those insured publicly for prescription drugs, authenticate and attest of health problems experienced by mothers.

Québec's 2006 new leave program is mainly characterized by higher replacement ratios of pre-birth earnings (for at most 1 year plus a specific policy leave for fathers) compared to the federal CEIP leave program. We have found very few studies on the impact of benefit enhancements on family members. Bergemann and Riphahn (2011) and Kluve and Tamm (2013) study the labor supply effects of a recent (2007) German reform.[12] It involves a change from a means-tested maternity leave benefit system that paid a maximum of 300 Euros per month for up to 2 years to a benefit system that replaces 67 percent of pre-partum parental labor earnings (from employment or self-employment) for either the father or mother for up to 12 months postpartum. If both father and mother participate, they can receive an additional 2 months of leave or benefits, and the resulting total leave of 14 months can be freely distributed between the two parents. The transfer is topped-up at 1,800 Euros per month, and a flat rate minimum of 300 Euros per month is paid to every parent who had no previous earnings. The take up rate of the transfer has been nearly 100 per cent. They find a significant decrease in mothers' employment probability during the 12 months after giving birth, and a significant increase in mothers' employment probability after the transfer ends.

4. Empirical strategy

To evaluate the effects of the 2001 and 2006 reforms, we use the natural experiments generated by the CEIP changes on 1 January 2001, and QPIP plan implemented on 1 January 2006, and medical

[12] Its intentions were to smooth or prevent households' earnings decline postpartum, make childbearing attractive for working women while keeping them attached to the labor market, and incentivize fathers to participate in childcare.

records on mothers giving birth from 1 October 2000 and 2005, to 31 March 2001 and 2006, respectively.

Our empirical strategy is based on a regression-discontinuity (RD) design with a discontinuity point on January 1st and a forcing variable that is the date of delivery. Similar identification strategies comparing mothers giving birth shortly before a policy change with those giving birth shortly after have been used in earlier work, for examples Dahl et al. (2013), Kluve and Tamm (2013), Schönberg and Ludsteck (2008), Lalive and Zweimüller (2009), and Ekberg, Eriksson and Friebel (2005). Dahl et al. (2013), Guertzgen and Hank (2013), and Humlum and Vejlin (2012) who all estimate the impact of the extension of maternal leave duration on a diversity of outcomes using a RD design and administrative data.

To be valid the strategy requires that mothers do not time births in response to the reform at the point of discontinuity (manipulation). If they do, it is possible that treatment and "controls" even when they have the same distribution of observed characteristics, may differ in terms of unobservable health factors. In fact, for the CEIP reform the legislative process was rather hastily done and for the QIPP discussions between the governments, federal and the Province of Québec's, for the opting out arrangements lasted more than 4 years. These timelines imply that at the point in time when those children born shortly after – and before – the reforms, were conceived, none of the parents knew that by the time their child was born the new programs would be in force. Additionally, timing of conception and date of birth cannot be completely controlled by parents, in particular, as we get closer to the discontinuity point. The RD strategy assumes that the assignment of treatments and controls is random at the discontinuity point. There is no formal test for this, but the assumption implies balance between treatment and controls. We show later that for the variables in our data set and a larger data set using monthly birth registries) - that mothers in both groups are extremely similar and also show that balance is achieved for the variables we do observe in the RAMQ data sets used in the regression analysis. We will discuss this issue more thoroughly in the section with the descriptive statistics. It is also important that physicians do not endogenously choose delivery dates for C-sections or at risk pregnancies. We shall also present evidence in this regard.

Two types of estimates of the new policy on the health of mothers will be presented in Section 6. Our main strategy however follows the work of Han, Todd, and van der Klaauw (2001), and van der Klaauw (1998), who propose fitting a local polynomial regression of outcomes on the forcing variable (in our case, date of birth) on both sides of the discontinuity, and estimating the causal effect at the discontinuity point, by comparing the fitted value of the polynomials at the discontinuity point. We shall also include in our tables a "bias-corrected" estimate based on a local polynomial regression

suggested by CCT (2014). Robust standard errors will also be computed by a method proposed by CCT.

The second type of estimate will be obtained with a simple linear regression analysis using as explanatory variable a treatment dummy indicating the mother gave birth in January rather than December, and control variables (the mother's age, and the region where delivery took place, and total health costs before delivery). Only mothers giving birth the first week of January and last week of December will be used for these estimations, i.e. observations "close" to the point of discontinuity. This approach is more intuitive and easily understood but is less credible for causal analysis in the RD framework.

Regression discontinuity design (RDD)

We suppose first that there is a sharp discontinuity determining the "treatment" group (mothers giving birth to a child on or after 1 January, are post-policy mothers). The eligibility to the treatment is denoted by the dummy variable $T \in \{0,1\}$, so that we have $T=1$ if $t \geq c$, and $T=0$ if $t<c$, where c is the discontinuity point January 1st (2001 or 2006), t is the date of birth. Suppose that X are control variables. This suggests a causal effect of the reform which can provoke a jump in Y at c. Assuming that the relation between Y and Z is linear, one can estimate the treatment effect θ by fitting the linear regression:

$$Y = \alpha + T\theta + Z\beta + \varepsilon \qquad (1)$$

We estimate the parameters in (1) with data from the last week in December and the first week in January without covariates and also adjusting for age, region, and lagged healthcare costs. In practice, the controls do not play an important role as both treatment and control groups are in general very well balanced.

Our main results will be obtained fitting local polynomials. A very simple representation of the estimation method is based on the following equation:

$$Y_i = \alpha + \mathbb{I}\,[t_i<c](g_l(c - t_i)) + \mathbb{I}\,[t_i \geq c](g_r(t_i - c) + \delta) + \varepsilon, \qquad (2)$$

Where Y is an outcome variable, $\mathbb{I}\,[.]$ is the indicator function, t is the date of birth of the child, c is the threshold value (January 1st), ε is an error term, and g_l and g_r are unknown functions. δ is the average treatment effect at the discontinuity point. Data for all six months is used to estimate equation 2. In the first step, a bandwidth is selected. Then the RD estimate of δ is obtained given this bandwidth.

Our main results are computed from local linear regressions (LLR) with controls using very recent software by Calonico, Cattaneo, Russell, and Titiunik (CCRT, 2016a, b). We present the estimation method following CCRT (2016a). Let us define the parameter of interest as:

$$\tau = \mathrm{E}[Y_i(T_i = 1) - Y_i(T_i = 0)|t_i = c]$$

The RD covariate adjusted treatment effect is written as:

$$\hat{\tau}(h)=\mathrm{e'}_{\mathrm{o}}\widehat{\boldsymbol{\beta}}_{Y+,p}(h) - \mathrm{e'}_{\mathrm{o}}\widehat{\boldsymbol{\beta}}_{Y-,p}(h),$$

Where $\widehat{\boldsymbol{\beta}}_{Y+,p}(h)$ and $\widehat{\boldsymbol{\beta}}_{Y-,p}(h)$ are defined through:

$\hat{\theta}_{Y,p}(h) = \mathrm{argmin}_{\beta_-,\beta_+,\gamma} \sum_{i=1}^{n}(Y_i - \ \mathrm{r}_{-,p}(t_i\text{-}c)\beta_- - \mathrm{r}_{+,p}(t_i\text{-}c)\beta_+ - Z'_i\gamma)^2 K_h(t_i - c)$, (3)

Where $\hat{\theta}_{Y,p}(h)=\left[\widehat{\boldsymbol{\beta}}_{Y+,p}(h)', \widehat{\boldsymbol{\beta}}_{Y-,p}(h), \hat{\gamma}_{Y,p}(h)\right]$, with $\beta_-,\beta_+ \in \mathbb{R}^{p+1}$

and $\gamma \in \mathbb{R}^d$, $\mathrm{r}_{-,p}(t_i)=\mathbb{I}(u < 0)(1, t, \cdots, t^p)'$, $\mathrm{r}_{+,p}(t_i)=\mathbb{I}(u > 0)(1, t, \cdots, t^p)'$, $\mathrm{e_o}$ the (p +1)-vector with a one in the first position and zeros the rest (picking out the constant in the regression), $K_h(u) = K(u/h)/h$, h the bandwidth, Z is a vector of covariates, and K, the kernel. For a given choice of K and h and p, the estimator is equivalent to estimating two weighted least square regressions, one for each side of the discontinuity point. When p=1, we get the standard local linear RD estimator, which we will be using throughout.

This strategy estimates the treatment effects using methods based on local randomization and limits the analysis to observations that lie within the close vicinity of the cut-point (the bandwidth) where the functional form is more likely to be close to linear. The main challenge here is selecting the right bandwidth, h. We address this issue using an optimal bandwidth computed by the method of CCRT.[13] Once the bandwidth is found, a LLR method with a triangular kernel is used to estimate the treatment effects. As mentioned above, we also estimate and present in the tables the treatment effects with a bias corrected estimator and bias-corrected robust standard errors of average treatment effects at the cut-off for a sharp RD design as suggested by CCRT. The CCRT software allows for a different bandwidth left and right of the discontinuity point and a MSE-optimal and CRE-optimal methods of computing the bandwidth. Our main results are computed with the MSE-optimal bandwidth selection method, with the same bandwidths on both sides of the discontinuity.

5. **Data and descriptive statistics**

Regression samples

[13] A STATA package written by CCRT (2016a) is used to compute the RD estimates as well as the Bias Corrected RD estimates with their optimal bandwidth approach.

The RAMQ extracted randomly data for 36,000 mothers[14] giving birth from 1 October to 31 March of the next year, for 2000-2001 and 2005-2006 (18,000 mothers per grouped years). This data is extracted from the Medical Registers and include all medical services provided by physicians over seven years (2 years before delivery and 5 after) for each mother. The Registers cover all medical services and costs billed to the RAMQ by physicians (generalist or specialist) enrolled in the public system (almost all, as mentioned earlier). These medical acts are paid at a fee-per-service rate negotiated between physicians and the provincial government and which differs by service provided. A complementary data set includes the cost of each prescription drug purchased by the mothers in the first sample who are covered by the PDIP and not on welfare when giving birth for the same time spans as the medical act data files.

Descriptive statistics

Table A1 presents total births in Quebec by month for years 2000, 2001, 2005, and 2006 as complied by the national birth registries. There is an evident seasonality pattern of birth over the 12 months of each year: there are fewer births in the first and last two months of the year. Furthermore, there is an increase in births in years 2005 and 2006, compared to the other periods, especially in 2006.

Tables 1, 2 and 3 present statistics from our samples. Table 1, based on RAMQ data, presents the number of mothers giving birth by month and year for both the entire sample (top panel) and mothers eligible to the prescription drug public plan (PDIP) (bottom panel) at the time of birth. In our random sample, we observe the same pattern as in the administrative records: mothers delivered slightly less births in November to February, and, for all years, births are more prevalent in March for the two periods sampled. The number of births for mothers registered to the PPDIP follows the same patterns. The bottom panel of Table 1 also shows that a fairly large number of mothers (including welfare mothers) are insured by the public drug plan (>55%).

Table 2 shows the number of prescriptions by year, month, and eligibility status for mothers insured by the PDIP. Some mothers covered by a private plan can purchase drugs and be reimbursed by the government for specific drugs such as for sexually transmitted diseases or certain flus such as H1N1. Most of the purchased drugs in our data set appear in the sample either because mothers have no private plan or because they are on welfare (column 6).[15]

[14] Excluding welfare mothers at time of delivery reduces the total samples by 4,092 mothers. They are identified by their status in the PDID registers.

[15] We have no information on individual purchases for those covered by private drugs insurance plans.

Table 3 shows purchases by month and year and eligibility (enrollees or welfare recipients) for all types of drugs and drugs related to central nervous system agents. We observe that for non-welfare mothers 20 percent of all drugs are related to central nervous system agents (mainly antipsychotic and antidepressant drugs). The percentages of these drugs are much larger for mothers on welfare. In the regression analysis on drug costs and consumption, we ignore those drugs supplied universally and freely by the government (for STDs, tuberculosis, OCU and H1N1 as described in Table 2). We also exclude mothers on welfare at the time of birth because they are not eligible for maternity leave benefits.[16]

Figure 3 presents the number of delivering mothers by day and month for the two groups in our sample. We notice that in 2005 and 2006, births were particularly low for December 31 and New Year`s Day. Therefore, we will produce for both groups, a RD analysis which omits births surrounding the New Year.[17]

We therefore perform a test suggested by McCrary (2008), using software found on his web site that seeks to identify jumps in the density of number of births at the discontinuity. Figures 4.1 and 4.2 displays the estimated density of the running variable, which is rather uniform. Data used for Figure 4.2 excludes December 31. There is an apparent beak at the discontinuity, larger in 2005-2006, but we cannot reject the null of no manipulation with the McCrary statistic. However, we estimate the effect for several cases excluding days close to the discontinuity and basically come to the same conclusion.

Table 4 present the means of the explanatory variables in our two samples (2000-2001, 2005-2006). We report the means and standard deviations for the dummy variables (by age group and region of residence, in French) as well as for costs and medical acts during (271 days before delivery) and before the pregnancy (covering approximately 458 days). We report means by survey period (2000-2001, 2005-2006), for 3 time intervals, 1 October to 31 March (all births), 25 December to 31 December, and 1 January to 7. Given the RD design, it is important that the means be close to each other in the last two columns, which is the case except for the cost of prescription drugs, for which means, however, are computed with a relatively small number of observations and could be more sensitive to outliers.[18]

[16] They are identified by their status from the Prescription Drug Registers.
[17] In fact, when these dates are on a Saturday or Sunday (the same apply to December 25th) births are "moved" further in time.
[18] Several acts with possibly different fees can be performed in the same visit.

Table A2, also based on administrative birth registers, present mothers' and newborn mean characteristics by month and year for the months of delivery in our samples. The statistics indicate that averages of variables such as the mothers' place of birth, age groups or mean age, mother tongue, family status, levels of education, and sex of the child, birth weight (low birth incidence), mean number of gestation weeks, birth order and single birth, are extremely similar on both sides of the discontinuity.

Mothers do not receive medical services every day or month, these services are rather bunched around main events such as pregnancy (prenatal diagnostics and acts), delivery, postnatal acts, and psychiatric diagnostics. In each of our samples, when no specific act is coded during the observed time span for a specific mother, we code costs, number of acts or visits for medical services as a zero, otherwise the data sets record the date, nature, institution where the visit occurred, diagnostic associated with the service, and the fee-for-service billed by physicians. The medical costs for the RAMQ (invoices) were deflated by prices indexes (from Statistics Canada) of medical services and drug prices in Québec.

The means for health outcome variables computed over the 5 years following delivery appear in Table 5. Basically, for variables in the physician billing files, we chose as dependent variables: fees, number of medical acts and number of visits in all settings and the same variables but for cases where the act was performed in a hospital. These same averages are also computed but for only for cases with a mental health diagnostic (except for the number of hospital mental health related visits where compute the mean number of hospitalizations instead).

For the full sample, in 2000-2001, average costs are $2,113, while they are $2,190 in 2005-2006. As the average number of medical acts over this period is between 45 and 50, costs per act are on average close to $40. Fees billed in hospitals comprise slightly more than half of total costs. Acts in hospitals are much costlier. Average prescription drug purchases over 5 years are $329 in 2000-2001 and $421 in 2005-2006 reflecting the rapid increase in prescription drug prices as the average for number of drugs purchased increased very slightly from 2000-2001 to 2005-2006.

The difference between the last two columns can be considered a rough RD estimate of the effect of the policies for period 6 i.e. 5 years following child birth. Let us start with the 2000-2001 policy change. In a large majority of cases the differences are rather small except for the case of prescription drugs. However, in this latter case, the standard deviation for the January data is very large due to outliers. Our regression analysis will assess the robustness of results to outliers by removing from the sample, observations with values in the upper 1 percent of the outcome distribution. Moving to the 2005-2006 means, once again differences between columns 2 and 3 are rather small at first glance

except for prescription drugs. But once more, the size of the standard deviations point to outliers. Prescription drug means are also more sensitive to outliers because of the smaller number of observations explained by the fact these mothers are not on welfare and are not covered by a private plan.

To distinguish between short and long-run effects and pre-existing health conditions, we constructed 6 time spans for the 7 years of data we obtained for each mother. The periods used in the rest of the paper are defined as follow: (1) days -271 to -1 (before delivery day), (2) delivery day to 182 days after delivery (6 months), (3) day 183 to day 365 (next 6 months), (4) day 366 to 731 (year 2 after delivery), (5) day 732 or more (last 3 years of data observation), (6) day 0 or more (5 years from delivery). Note that total individual healthcare costs and services for days -730 to -272 are used as a proxy for lagged health when regressions are performed with period 1 data. Lagged costs are computed for costs incurred from 271 days before delivery to the day before delivery for regressions performed with data from periods 2 to 6. We will be particularly interested in estimates for the 7 to 24 months period in 2000-2001 as the new policy increased the benefit period from 6 to 12 months. In the next section, parametric and RD estimates of the impact of the two programs are presented for each of these six periods.

Table 6.1 presents the average of the dependent variables again for years 2000-2001 and 2005-2006 but for the 6 sub-periods defined above. We immediately notice that a large proportion of costs over 5 years are the result of fees charged to the RAMQ in period 2, because of delivery costs. Tables 6.2 and 6.3, present means for mothers giving birth the last week of December and first week of January again for all dependent variables. They are, for a given sub-period, rather close to each other, suggesting small average treatment effects by sub-period. We also observe that mental health costs are relatively small compared to total costs. Mothers with post-partum depression could be treated by psychologists rather than by general practitioners or psychiatrists, but these costs are not reimbursed by the RAMQ and therefore not available in the data sets.

6. Estimation results

RD Graphical analysis (see Appendix)

Before presenting and discussing econometric estimates of the mean effect of the policy, we present first graphs displaying the evolution of mean outcomes before January 1st and January 1st onwards providing a picture of the RD design and estimate. The graphical analysis is based a procedure (rdplot) written for STATA by CCRT. As the authors write, the main aspects of the RD design can be summarized in an easy-to-interpret figure, which shows how an estimated regression

function behaves for control and treated units. (In most empirical applications, this figure is constructed using "dots" for local sample means over non-overlapping bins partitioning a restricted support of the forcing variables (in our case date of birth), together with two smooth "global" polynomial regression curve estimates for control and treatment units separately. The binned means are usually included to capture the behavior of the "cloud of points" and to show whether there are other discontinuities in the data away from the cut-off; the two global polynomial estimates are meant to give a flexible global approximation of the expected value of the outcome variable on both sides of the discontinuity point.

Calonico, Cattaneo, and Titiunik (2014a) study these RD plots and develop several (optimal) choices of the number of bins under two partitioning schemes: evenly spaced and quantile spaced partitions. We produce graphs using evenly spaced partitions and a fourth-order polynomial. Bin sizes chosen using the optimal approach suggested by these authors were found to be small such that the graphs were not very clear. We use larger bins of 6 days for purposes of clarity. However, the illustrated gap at the discontinuity point was not affected by this choice. Confidence intervals are drawn around the mean value of the outcome variable in each bin. The appendix shows these RD plots for medical fees (all fees) and those related to mental health, and costs for prescription drugs and those related to mental health for the six chosen time periods and years 2000-2001 and 2005-2006.

We start by discussing the graphs on medical fees. The main conclusion from these graphs is that if there are statistically significant effects as evidenced by the distance between lines at the discontinuity point they will be in general very small in percentage value. There is however evidence of a large effect for mental health costs in periods 3 (7-12 months) and period 4 in 2000-2001, however the graph for the time-span corresponding to period 4 (year 2 after delivery) displays an unusual dip the last week of the year, which is difficult to explain and may simply be an outlier. As explained earlier, we also perform regressions removing outliers from the sample. The second set of graphs concern prescription drug costs. Clearly, there is more variability for these costs as the number of observations is approximately 2 and half smaller than for medical fees. The evidence is mixed for these cases and formal regression analyses are required for proper inference concerning the effects of the policy.

Non-parametric RD estimated effects of the policies

Tables 7.1 to 7.6 present the results from the non-parametric local linear regressions with date of birth as the forcing variable and covariates described earlier in the paper. The estimates are based on equation (3) and use all mothers in the sample to compute an optimal bandwidth. Tables 7.1 and 7.2,

cover all medical costs, medical acts and visits respectively for the years 2000-2001 and 2005-2006 (the number of observations for the two samples are respectively, 15,705, and 16,073). The dependent variables are : (1) costs for all medical acts; (2) costs of mental health acts;[19] (3) number of medical acts; (4) number of mental health acts; (5) total number of medical visits; (6) number of mental health visits. The first panel presents results obtained with the optimal bandwidth,[20] the second, with twice the optimal width.[21] The average size of the optimal bandwidth for all regressions is around 40 days.

Each panel presents results from two methods: conventional (as in Han et al.) and bias-corrected both with robust standard errors. Almost all estimated effects are and not significant. They are also rather small in terms of the percentage with respect to the means of the variables or their standard deviations shown in Table 5. Some significant estimates are rather interesting given that they are negative, are for mental health costs, and occur in the interval of 0 to 24 months in 2001. The 2001 policy effectively increased substantially the length of leaves from 6 to 12 months. The estimates for months 6 to 12 for these mental health costs are significant for 3 out of 4 cases in Table 7.1 (bias-corrected with optimal bandwidth is not significant). When the bandwidth is doubled the estimated effects for mental health costs are very similar to optimal bandwidth estimates with similar standard errors. Periods 3 and 4 are stressful periods for mothers with a very young child as they must manage the stress of returning to work and leaving the child as they return to work. It is therefore, for this period that we would expect a negative effect on mental health costs. When we estimate the model excluding the observations from the top percentile of the outcome distribution the effects on mental health costs are in this case much smaller (results in Table A3.1), but remain significant for period 3 contract. However, this latter result is not robust to doubling the bandwidth. For the years 2005-2006 associated with the Québec reform, we do find some positive and significant effects but once more they are not robust to the exclusion of the top percentile.

Tables 7.3 and 7.4 are for physician costs in a hospital setting (sample sizes are the same as for Tables 2 and 3) as well as number of hospitalizations. The outcomes identified in the Tables are, from columns 1 to 5: (1) costs of physician services during hospitalization; (2) costs of the physician services related to mental health in a hospital; (3) number of medical acts in hospital; (4) number of medical acts of a mental health nature (from the diagnostic of physicians treating the patient) in a

[19] Acts are classified as of mental health nature from the diagnostic codes of physicians. A very large majority of mental acts in the data sets are provided by generalists.
[20] The optimal bandwidth varies from approximately 20 to 30 days in most regressions. The number of observations presented is for the sample of mothers used to find the optimal bandwidth.
[21] The estimations were also conducted with half the bandwidth. The results are very similar and not presented for space considerations, but are available from the authors.

hospital; (5) number of hospitalizations. For the years 2000-2001, all estimates are very small and only a few, probably by chance, are statistically significant. The estimates for 2005-2006 reflect what was found in Table 7.3 for all costs.

Tables 7.5 and 7.6 analyze prescription drug costs. The outcomes are, from columns 1 to 5: (1) net costs for drugs; (2) net costs for all prescribed drugs related to mental health; (3) total costs of medical acts associated with prescribed drugs including net costs for all prescribed drugs; (4) number of all prescribed drugs; (5) number of all prescribed drugs related to mental health. Estimates suggest that there is very little evidence that the extended maternity leave in 2001 and the benefit boosting of 2006 reduced purchases of prescription drugs. However, we note that the estimated effects have very large standard errors reflecting the much smaller number of observations for out sample of mothers covered by the public plan.

The results in these tables do not mean that there were no health or well-being benefits from the policy, but we almost do not find any as proxied by reduced physician fees (and number of acts and visits by type) and prescription drug costs (and number by type) assumed by the public insurance regime. And if there were some effects, our estimates inform us that they would be rather small given the mean value of the outcomes and standard deviations of these outcomes. Finally, all the results are robust to different chosen doughnut holes in the data i.e. removing data from days surrounding the discontinuity point or data from January 1.

Parametric RD effects

Tables 8.1 to 8.3 present the parametric RD estimation (corresponding to equation (1)) results respectively for the medical costs, acts and visits (Table 8.1), net costs and number of prescribed drugs (Table 8.2), and number of hospitalizations with associated medical costs (Table 8.3). Each Table and its panels present only the estimated treatment effect and t-statistic. Panels A and B refer respectively to the years 2000-2001, and 2005-2006. Note that the sample consists of births occurring from December 25 to January 7 (24 December to 7 January in 2005-2006, excluding 31 December). The specification has a treatment dummy, a lagged cost, and two control variables (age groups of mothers and region where the delivery took place).

Table 8.1 (medical costs, acts and visits) presents six outcomes at the top of columns 1 to 6 for each time span. Very few of the estimates are statistically significant for the two expansions (panels A and B); and if they are, the treatment effects are small compared to observed means (see Table 6.1). As in Table 7.1, the effect on mental health costs for the 2001 reform is negative and significant for the last 6 months of year 1 after delivery, but is this result is again not robust to the removal of outliers. The coefficient for year 2 is rather similar to the non-parametric effect but not quite

significant. Tables 8.2 for prescription drug costs and 8.3 for hospital costs show few significant effects. To investigate strategic behavior of physicians around New Year, we estimated the treatment effect on the probability of giving an "at-risk" birth as defined by the RAMQ and the probability of a C-section for mothers giving birth around January 1 for both reforms and found no significant effects.

Therefore, our results, with both methods, are consistent with what is found elsewhere in the literature on this topic, that increasing the generosity of maternity leave parameters does not seem to have an impact on the health costs of mothers after giving birth when the leave policy is already generous before an expansion. The impact from the 2001 policy change may reduce mothers' mental health costs, slightly, just before and as they are returning to work. The main reason for these global results of small or no effects is probably that, in general, mothers are young when they give birth and are generally in very good health. Also, it may be that the effects on health are non-linear with stronger effects obtained when comparing no leave with a few months of leave, but after a certain amount more leave could have a marginal effect.

7. Policy discussion

Benefits, financial costs and tax burden

The literature on the effects of changes in maternity leave policy (mostly enhancements of the policy in the last decade, leading to more time for parents at home after birth as well as additional income) are difficult to synthesize because the policy contexts in which estimates are performed are very different. Moreover, the empirical evidence depends on the major beneficiaries considered, mothers, children, or the family.

A certain pattern emerges from papers on children. Stronger positive effects of enhancements to parental leave policies on health or child development indicators are found in contexts where there is little policy to start with (Carneiro et al. 2015; Rossin, 2011). When changes (positive in most studies) occur in a context where the policy is already relatively generous (six months of paid leave or more) the effects are considerably smaller or statistically not significant (Dahl et al. 2013; Dustmann and Schonberg, 2012; Liu et al., 2010; Rasmussen 2012). Two studies find some positive effects in a particular context, Cools et al (2015) on children in families with a highly educated father living with a lower educated mother, and Danzer and Lavy (2013), on PISA scores, for the children of highly educated mothers. For the Canadian reform of 2001, Baker and Milligan find positive effects on breastfeeding which is found in most studies to be helpful to the health and well-being of children, but cannot find direct positive effects on children (2015, 2012, and 2010). Haeck (2013) finds that the 2001 policy reform did improve the lot of children, however, these effects are relatively weak and

should not translate into large societal benefits (over and above increasing the level of utility of mothers and fathers covered by the parental leave program). As for the 2006 Québec policy, Haeck, Merrigan and Paré, (2015) (with survey data and aggregate administrative data) find very little positive effects of the policy on the outcomes of infants or toddlers.

Cost and benefit issues surrounding parental leave extensions are rarely addressed in studies on the impact of leave policies (except briefly by Rossin (2011); and, more extensively by Dahl et al. (2013). It is possible that longer paid leaves have increased disparities in early childhood health and between eligible and ineligible mothers from different socio-economic backgrounds. With a 100% income replacement ratio and very high insurable earnings (up to $75,000 in 2010), Dahl et al. (2013) qualify the recent expansions of the Norwegian program as conducive to pure leisure transfers from middle income and ineligible families to upper income families with no other positive and distinctive social outcomes. We believe this may also be particularly true of the 2006 Québec policy.

From 1996 to 2006, the parameters of the federal CEIP were 'frozen'. Since these benefits replace only a proportion of insurable earnings—up to 75% in Québec (since 2006) and 55% outside Québec - most families experience a reduction in household income during the work absence. Hence, Québec's leave program expansion has offered a better compensation for time off-work for a higher proportion of new mothers (see Table 10). However, high earner mothers have made the most of Québec's leave program expansion (jump of $20,000 in insurable earnings and replacement rates). To compensate for earnings lost by employees on leave, some employers provide mothers with a Supplemental Unemployment Benefit (SUB), also known as a top-up. One in five mothers has an EI/QPIP employer top-up benefit. In 2001 (2005), 24 (32) percent of Québec's mothers with CEIP benefits had a SUB, for an average period of 19 (32) weeks.

When discussing the estimation results, we did not document the total costs of medical acts or prescription drugs compared with the leave programs monetary benefits for mothers (and their family). Table 9 presents summary statistics on total costs, number of medical acts and prescription drugs, and number of mothers and births by month and year. The overall evidence tells that both expansions had very marginal impacts on health care costs (medical and drugs). Moreover, these costs are modest.

Women bearing a child must take some time off work during (at least at the end of) pregnancy and the first months of their child's infancy. A leave policy which ensures job security with minimum mandated number of paid weeks leave is likely to reduce stress during and after the pregnancy with crucial impacts on health, family's material resources available, and overall well-being. All these elements may also have effects on children's outcomes, although the evidence is very mixed (see

Baker and Milligan (2010, 2015) for Canadian results). The federal reform of 2001 can be credited with more substantial effects on time off-work and with a new child (Figures 1 and 2). Québec's new 2006 regime appears to have no effects on these outcomes.

Therefore, up until now, there is little evidence that expansions of the type implemented in the 2000s in Canada and the province of Québec produce substantial social benefits over and above increasing parents' wellbeing, which is consistent with studies that estimate the effects of more generous leave when policies are relatively generous to start with, however, as shown in Table 10, the costs of these policies are rather high.

8. Summary and conclusion

We use a RD approach to estimate the impact on medical and prescription drug costs of significant expansions in two parental leave programs in Canada, the first basically increasing the time mothers stay home with the child after birth, the second increasing family income and also increasing the time father's may spend at home with the newborn (three to five weeks). We find little evidence that these policies had a strong impact on such costs. This does not mean of course that the policy did not increase the well-being of families; it simply says that the government will not observe any pecuniary returns from decreased health costs because of these policies. Our results are rather similar to a host of studies on enhancements of parental leave policy which find little societal benefits of these policies. It is possible that these societal benefits (over and above parental welfare) are much greater when enhancements are implemented in a context where countries have no parental leave policies or very stingy policies. Therefore, it is important to consider other aspects of the impact of the policy such as distributional aspects. Given the high costs of these policies, in particular the new 2006 Québec policy, governments should reconsider certain parameters to make neo-natal policies more efficient and less inequitable, in particular for mothers who have not access to parental leave or benefits.

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Box 1: Canada Employment Insurance Parental benefits (CEIP) compared over years and Québec Parental Insurance Plan benefits (QPIP) 2006

	CEIP 2000	CEIP 2001	Québec basic plan 2006	Québec special plan 2006
Coverage	Canadian new parents	Canadian new parents	Québec' s new parents	Québec' s new parents
Eligibility	700 hours of "insurable employment" over 1 year	600 hours of "insurable employment" over 1 year	$2000 earnings	$2000 earnings
Basic replacement rate	55 percent	55 percent	70/55 percent	75 percent
Low-income replacement rate*	65 percent(<$25,921)	80 percent(<$25,921)	80 percent <$25,921)	80 percent<$25,921
Maximum insurable earnings	$39,000# Max. of $412/week	$39,000# Max. of $412/week	$57,000## Max of $767/week	$57,000## Max of $822/week
Duration	15 weeks maternity 10 weeks parental	15 weeks maternity 35 weeks parental	70%/25 weeks + 55%/25 weeks 18 weeks maternity 32 weeks parental 5 weeks, father only	75%/15 weeks maternity 25 weeks parental 3 weeks, father only
Self-employed	Not covered	Not covered	Covered	Covered
Waiting period	2 weeks**	1 week if parent sharing	None	None
Mandated Parental Leave by jurisdiction (weeks)	Québec (70); Other provinces (17-35)	Québec (70); Other provinces (52)	Québec (70)	Québec (70)

Notes: # From 1996 to 2006; in 2007: $40,000; in 2013: $47,400. ## Insurable earnings have increased each year and are $67,500 in 2013. * Total family income cut-off for eligibility to a low-income replacement rate has not changed over the years. ** In 1978, the government of Québec introduced a program to compensate the 2-weeks waiting period for mothers only eligible to the federal maternity leave ($240 per week). In May 1990, the maternity benefit was raised to $360 per week. The program was cancelled in 2006.

Table 1: Samples of delivering mothers by year and month

	Sample 1: 2000-2001		Sample 2: 2005-2006		All
	Pre-reform	Post-reform	Pre-reform	Post-reform	
Month	2000	2001	2005	2006	Total
1	0	3,018	0	3,076	6,094
2	0	2,943	0	2,979	5,922
3	0	3,486	0	3,243	6,729
10	2,930	0	3,101	0	6,031
11	2,813	0	2,859	0	5,672
12	2,810	0	2,742	0	5,552
Total A	8,553	9,447	8,702	9,298	36,000
Total B	18,000		18,000		36,000
	Prescription drug eligibility				
Month	2000	2001	2005	2006	Total
1	0	1,794	0	1,818	5,295
2	0	1,785	0	1,646	5,055
3	0	2,001	0	1,839	5,664
10	1,833	0	1,833	0	5,412
11	1,734	0	1,682	0	5,008
12	1,719	0	1,641	0	5,025
Total	5,286	5,580	5,156	5,303	31,459

Source: Authors' computations from RAMQ data sets.
Note: Sample 1 is the federal maternal leave policy change group; sample 2 is the Québec maternal leave policy change group.

Table 2: Total number of prescription drugs and percentage purchased by year and eligibility status, 2000-2001 and 2005-2006

	(1)	(2)	(3)	(4)	(5)	(6)	
Status	STD	Tuberculosis	OCU	H1N1	Enrollees	Welfare	Total
Year				2000			
Freq.	564	224	387	0	86,896	61,475	149,546
%	0.38	0.15	0.26	0	58.11	41.11	100.00
Year				2001			
Freq.	500	264	451	0	91,848	63,557	156,62
%	0.32	0.17	0.29	0	58.64	40.58	100.00
Year				2005			
Freq.	429	203	1,971	30	86,32	60,745	149,698
%	0.29	0.14	1.32	0.02	57.66	40.58	100.00
Year				2006			
Freq.	435	179	2,052	35	92,359	54,477	149,537
%	0.29	0.12	1.37	0.02	61.76	36.43	100.00

Source: Authors' computations from RAMQ data sets.
Notes: STD: for a sexually transmitted disease; Tuberculosis: eligibility by default; OCU: oral contraception emergency; H1N1: for influenza; Enrollees: persons who are not eligible for a private plan and must therefore pay the public plan premium to be enrolled in the plan; Welfare: Welfare recipients.

Table 3: Number of prescription drugs by type, eligibility status, and year, 2000-2001 and 2005-2006

	Sample 1: 2000-2001		Sample 2: 2005-2006	
	Pre-reform	Post-reform	Pre-reform	Post-reform
Month	2000	2001	2005	2006
1	0	23,796	0	23,217
% CNSA		19.1		22.9
2	0	19,499	0	20,706
% CNSA		18.0		20.9
3	0	24,884	0	26,995
% CNSA		19.1		19.9
10	21,178	0	20,540	0
% CNSA	17.0		22.1	
11	21,312	0	19,388	0
% CNSA	23.8		21.2	
12	20,804	0	22,625	0
% CNSA	20.1		21.9	
Total	63,294	68,179	62,553	70,918
% CNSA	20.3	18.8	21.7	21.0
Total N-Enrollees	2,066	2,175	1,960	2,051
Mothers eligible by welfare status to the public prescription drugs plan at day of childbirth				
1	0	19,628	0	16,401
% CNSA		29.6		29.9
2	0	19,666	0	13,671
% CNSA		34.6		25.9
3	0	20,487	0	19,259
% CNSA		30.1		25.7
10	18,359	0	19,075	0
% CNSA	23.1		32.4	
11	19,431	0	18,990	0
% CNSA	30.8		31.9	
12	21,218	0	20,469	0
% CNSA	32.6		38.7	
Total	59,008	59,781	58,534	49,331
% CNSA	29.1	31.4	34.4	27.1
Total N-Welfare	1,143	1,152	935	862
Total N	3,209	3,327	2,895	2,913
% Adherent	64.38	65.37	67.70	70.41
% CNSA				
Adherent	20.3	18.8	21.7	21.0
Welfare	30.1	31.4	34.4	27.6

Source: Authors' computations from RAMQ prescribed drugs registries.

Notes: CNSA: Central nervous system agents (antipsychotic and antidepressant medication drugs). Sample 1 is the federal maternal leave policy change group; sample 2 is the Québec maternal leave policy change group.

Table 4: Age groups, regions, and other control variables summary statistics, 2000-2001 and 2005-2006

Control variables	Oct. 2000-Mar. 2001	Dec. 25-31 2000	Jan. 1-7 2001	Oct. 2005-Mar. 2006	Dec. 24-30 2005	Jan. 1-7 2006
15-19 year olds	0.02 (0.14)	0.02 (0.16)	0.03 (0.17)	0.01 (0.12)	0.01 (0.10)	0.01 (0.12)
20-24 year olds	0.19 (0.39)	0.19 (0.40)	0.20 (0.40)	0.15 (0.36)	0.16 (0.37)	0.16 (0.36)
25-29 year olds	0.35 (0.48)	0.35 (0.48)	0.35 (0.48)	0.38 (0.48)	0.38 (0.49)	0.37 (0.48)
30-34 year olds	0.29 (0.45)	0.29 (0.45)	0.27 (0.44)	0.31 (0.46)	0.30 (0.46)	0.33 (0.47)
35-40 year olds	0.13 (0.34)	0.12 (0.33)	0.13 (0.34)	0.13 (0.33)	0.12 (0.33)	0.10 (0.30)
40-49 year olds	0.02 (0.15)	0.02 (0.15)	0.03 (0.17)	0.02 (0.15)	0.02 (0.15)	0.03 (0.17)
Region 1	0.03 (0.16)	0.04 (0.18)	0.03 (0.16)	0.02 (0.15)	0.02 (0.13)	0.03 (0.16)
Region 2	0.04 (0.19)	0.04 (0.20)	0.04 (0.20)	0.04 (0.19)	0.04 (0.20)	0.04 (0.20)
Region 3	0.08 (0.27)	0.10 (0.3)	0.09 (0.28)	0.08 (0.27)	0.09 (0.28)	0.07 (0.26)
Region 4	0.06 (0.23)	0.08 (0.25)	0.05 (0.21)	0.05 (0.23)	0.05 (0.23)	0.07 (0.26)
Region 5	0.04 (0.19)	0.03 (0.18)	0.04 (0.18)	0.04 (0.20)	0.04 (0.19)	0.04 (0.19)
Region 6	0.26 (0.44)	0.24 (0.43)	0.23 (0.44)	0.26 (0.44)	0.28 (0.45)	0.22 (0.41)
Region 7	0.04 (0.20)	0.04 (0.18)	0.05 (0.22)	0.04 (0.19)	0.05 (0.22)	0.03 (0.16)
Region 8	0.02 (0.14)	0.02 (0.13)	0.02 (0.13)	0.02 (0.14)	0.03 (0.18)	0.01 (0.11)
Region 9	0.01 (0.11)	0.01 (0.09)	0.01 (0.12)	0.01 (0.11)	0.01 (0.09)	0.01 (0.11)
Region 10	0.01 (0.10)	0.01 (0.11)	0.01 (0.11)	0.01 (0.10)	0.01 (0.10)	0.01 (0.10)
Region 11	0.06 (0.23)	0.06 (0.23)	0.05 (0.21)	0.05 (0.23)	0.04 (0.20)	0.05 (0.22)
Region 12	0.05 (0.22)	0.04 (0.20)	0.04 (0.20)	0.05 (0.22)	0.07 (0.26)	0.07 (0.26)
Region 13	0.05 (0.22)	0.06 (0.24)	0.05 (0.23)	0.06 (0.23)	0.05 (0.22)	0.06 (0.23)
Region 14	0.07 (0.25)	0.06 (0.23)	0.08 (0.27)	0.07 (0.26)	0.05 (0.22)	0.09 (0.28)
Region 15	0.18 (0.38)	0.18 (0.38)	0.16 (0.38)	0.19 (0.39)	0.16 (0.36)	0.20 (0.40)
Observations	15,705	491	576	16,203	459	660
			Before pregnancy			
Total cost all acts	346 (439)	364 (490)	349 (470)	353 (465)	355 (522)	390 (516)
Total acts	10.5 (11.4)	10.5 (11.7)	11.2 (14.5)	10.1 (11.5)	9.6 (13.6)	11.0 (15.0)
Total cost MH	17 (119)	14 (97)	15 (89)	15 (87)	14 (71)	16 (68)
Total acts MH	0.47 (2.5)	0.39 (2.1)	0.46 (2.6)	0.49 (2.6)	0.47 (3.0)	0.52 (2.1)
Observations	15,705	491	576	16,203	459	660
Net cost drugs	56 (310)	46 (107)	68 (243)	66 (381)	57 (169)	66 (201)
Net cost MH drugs	8 (55)	4 (27)	6 (52)	12 (92)	14 (114)	11 (59)
Observations	6,536	194	232	5,808	182	191
			During pregnancy			
Total cost all acts	491 (285)	481 (260)	492 (281)	489 (316)	418 (292)	508 (287)
Total acts	21.2 (11.8)	21.2 (10.6)	21.1 (11.3)	22.0 (12.7)	19.1 (11.6)	22.9 (12.6)
Total cost MH	6 (51)	5 (33)	4 (28)	6(48)	3 (19)	7 (38)
Total acts MH	0.16 (1.1)	0.15 (1.0)	0.15 (0.98)	0.20 (1.8)	0.10 (0.8)	0.25 (1.4)
Observations	15,705	491	576	16,203	459	660
Net cost drugs	36 (201)	46 (326)	32 (88)	60 (306)	55 (228)	43 (108)
Net cost MH drugs	2 (27)	1 (8)	1 (15)	3 (40)	7 (88)	3 (17)
Observations	6,536	194	232	5,808	182	191

Note: Authors' computations from RAMQ data sets. Regions are as follows: 1-Bas-Saint-Laurent, 2-Saguenay-Lac-Saint-Jean, 3-Québec, 4-Mauricie et Centre-du-Québec, 5-Estrie, 6-Montréal, 7-Outaouais, 8-Abitibi-Témiscamingue, 9-Côte-Nord, 10-Gaspésie-Îles-de-la-Madeleine, 11-Chaudière-Appalaches, 12-Laval, 13-Lanaudière, 14-Laurentides, 15-Montérégie. MH indicates mental health.

Table 5: Outcomes summary statistics, 2000-2001 and 2005-2006

	2000-2001	2000	2001	2005-2006	2005	2006
Outcome	Oct.-Mar.	Dec. 24-30	Jan. 1-7	Oct.-Mar.	Dec. 24-30	Jan. 1-7
Total cost	2113.02	2190.2	2106.04	2190.18	2197.39	2273.27
	(1221.31)	(1232.45)	(1093.31)	(1292.94)	(1364.98)	(1335.88)
Acts N	45.64	45.57	44.54	48.58	47.87	50.04
	(34.71)	(32.8)	(29.8)	(35.16)	(36.02)	(37.49)
Total cost MH	79.53	82.22	69.44	76.67	69.05	83.44
	(288.76)	(272.39)	(242.62)	(311.84)	(270.08)	(269.73)
Acts MH N	2.63	2.67	2.42	2.81	2.52	2.94
	(8.69)	(8.13)	(8.51)	(9.61)	(9.21)	(8.91)
Visits N	35.01	35.02	34.14	34.19	33.99	35.00
	(24.99)	(23.91)	(21.56)	(23.57)	(24.24)	(24.51)
Visits N MH	1.78	1.87	1.56	1.64	1.51	1.82
	(5.73)	(5.48)	(4.69)	(5.81)	(5.22)	(5.63)
Observations	15705	491	576	16158	470	660
Total cost hosp.	1076.53	1169.37	1092.94	1145.47	1147.13	1187.16
	(694.66)	(710.81)	(647.14)	(729.94)	(759.67)	(742.19)
Acts hosp. N	7.29	7.36	7.03	7.56	7.18	8.03
	(11.67)	(8.1)	(9.39)	(9.9)	(9.06)	(11.41)
Total cost MH hosp.	2.46	6.93	1.2	2.53	0.75	2.61
	(36.33)	(81.08)	(14.3)	(40.94)	(8.27)	(28.13)
Acts MH hosp. N	0.08	0.25	0.05	0.08	0.02	0.08
	(1.36)	(3.28)	(0.67)	(1.5)	(0.2)	(0.81)
Hosp. length Days	2.27	2.29	2.19	2.42	2.41	2.41
	(1.72)	(1.61)	(1.6)	(1.99)	(2.36)	(1.79)
Observations	15705	491	576	16158	470	660
Net cost drugs	329.82	249.89	452.28	420.86	591.21	504.44
	(1964.82)	(510.63)	(2598.38)	(3048.34)	(4829.9)	(3277.9)
Net cost drugs MH	70.15	78.35	78.27	74.97	28.89	71.95
	(450.72)	(300.93)	(544.49)	(644.18)	(116.14)	(260.22)
Total costs	3010.1	2852.4	2989.72	3111.14	3367.69	3335.53
	(2651.79)	(1598.68)	(2980.02)	(3686.89)	(5455.18)	(3842.17)
Number drugs	14.46	14.02	15.59	15.32	10.83	15.18
	(28.59)	(22.67)	(23.94)	(33.51)	(23.62)	(30.47)
Number drugs MH	3.13	3.47	2.61	3.54	1.88	4.34
	(12.66)	(10.22)	(9.08)	(16.02)	(5.22)	(12.68)
Observations	6536	194	232	5808	198	191

Note: N is number of acts or visits or hospitalisations or drug prescriptions; MH is for mental health.

Table 6.1: Outcomes by sub-period, Oct. 2000 – Mar. 2001, and Oct. 2005 – Mar. 2006

Interval in days	Cost $	Cost $ MH	Acts	Acts MH	Visits	Visits MH	Net cost of drugs $	Drugs MH $	Total cost	N drugs	N drugs MH	N Hosp.
2000-2001												
-271 to -1	490.54	5.51	21.23	0.16	16.86	0.12	55.07	3.19	539.52	2.2	0.16	0.66
	(285.15)	(51.04)	(11.8)	(1.1)	(8.18)	(0.86)	(247.88)	(33.51)	(426.43)	(4.54)	(1.08)	(1.09)
0 to 182	797.87	5.75	7.16	0.19	5.54	0.13	37.24	5.56	837.44	2.54	0.39	1.07
	(354.76)	(51.96)	(6.01)	(1.6)	(4.15)	(1.04)	(134.97)	(30.85)	(403.35)	(3.58)	(1.28)	(0.4)
183 to 365	93.59	6.18	3.21	0.2	2.53	0.14	43.43	7.37	142.1	2.48	0.37	0.07
	(174.67)	(43.1)	(5.09)	(1.2)	(3.67)	(0.82)	(183.54)	(40.5)	(283.98)	(4.11)	(1.48)	(0.32)
366 to 731	309.11	13.76	9.02	0.44	7.04	0.31	97.12	18.47	403.12	4.61	0.86	0.29
	(418.5)	(74.17)	(10.86)	(2.1)	(7.81)	(1.47)	(521.58)	(95)	(674.75)	(7.31)	(3.2)	(0.76)
732 to 1,825	912.45	53.83	26.25	1.81	19.91	1.2	330.51	76.71	1239.36	12.59	3.14	0.84
	(895.07)	(212.65)	(25.28)	(6.69)	(18.11)	(4.27)	(1895.07)	(473.28)	(2283.78)	(23.62)	(12.18)	(1.27)
0 to 1,825	2113.02	79.53	45.64	2.63	35.01	1.78	508.3	108.11	2622.02	22.22	4.76	2.27
	(1221.31)	(288.76)	(34.71)	(8.69)	(24.99)	(5.73)	(2420.61)	(555.87)	(2953.1)	(32.98)	(15.48)	(1.72)
2005-2006												
-271 to -1	490.18	5.73	22.1	0.2	16.79	0.13	87.37	4.74	569.38	2.65	0.26	0.6
	(315.6)	(48.36)	(12.67)	(1.79)	(8.52)	(1.14)	(365.04)	(48.25)	(555.64)	(5.68)	(1.59)	(1.05)
0 to 182	808.82	6.09	7.22	0.21	5.46	0.13	59.69	6.75	869.59	2.73	0.48	1.08
	(386.72)	(53.25)	(6)	(1.81)	(4.13)	(1.08)	(220.06)	(47.3)	(454.87)	(3.8)	(1.63)	(0.44)
183 to 365	85.56	5.05	3.14	0.18	2.34	0.12	47.01	8.19	136.31	2.29	0.36	0.07
	(167.36)	(38.99)	(4.96)	(1.33)	(3.39)	(0.82)	(306.66)	(65.89)	(375.37)	(3.95)	(1.73)	(0.42)
366 to 731	315.37	12.21	10.12	0.46	7.06	0.28	115.6	20.39	416.71	4.32	0.81	0.36
	(427.6)	(66.73)	(11.88)	(2.27)	(7.82)	(1.38)	(913.01)	(169.76)	(1053.05)	(8.33)	(3.62)	(0.86)
732 to 1,825	980.44	53.32	28.11	1.96	19.33	1.11	388.33	73.44	1334.26	12.82	3.41	0.91
	(965.32)	(234.53)	(25.46)	(7.1)	(16.78)	(4.25)	(2685.5)	(576.27)	(3054.12)	(27.59)	(14.65)	(1.45)
0 to 1,825	2190.18	76.67	48.58	2.81	34.19	1.64	610.63	108.78	2756.88	22.16	5.06	2.42
	(1292.94)	(311.84)	(35.16)	(9.61)	(23.57)	(5.81)	(3656.17)	(773.6)	(4170.18)	(38.46)	(19.1)	(1.99)

Note: 2005-2006 excludes 31 Dec. 2005; MH is for mental health; N hosp. indicates number of hospitalizations. N for 2000-2001 is 15,705 for general acts and 4,241 for prescriptions; N for 2005-2006 is 16,158 for general acts and 4,003 for prescriptions.

Table 6.2: Outcomes by sub-period, 1 week around breakpoint, 2000-2001

Interval in days	Cost $	Cost $ MH	Acts	Acts MH	Visits	Visits MH	Net cost of drugs	Drugs MH $	Total cost	N drugs	N drugs MH	N. Hosp.
-271 to -1	480.89	5.11	21.18	0.15	16.66	0.11	70.7	1.56	531.52	2.15	0.14	0.61
	(260.06)	(33.36)	(10.59)	(1.03)	(7.32)	(0.69)	(404.14)	(9.54)	(546.27)	(5.57)	(0.68)	(1.01)
0 to 182	847.28	15.16	7.6	0.42	5.9	0.28	34.64	7.54	876.17	2.62	0.54	1.07
	(398.17)	(170.01)	(7.96)	(4.72)	(5.53)	(2.97)	(76.77)	(41.45)	(455.27)	(4.19)	(2.82)	(0.37)
183 to 365	90.01	7.83	3.22	0.25	2.49	0.18	45.95	9.15	154.54	2.82	0.43	0.07
	(148.48)	(36.44)	(5.01)	(1.06)	(3.69)	(0.74)	(122.6)	(41.95)	(283.73)	(4.51)	(1.65)	(0.32)
366 to 731	321.38	14.67	9.3	0.49	7.14	0.35	79.18	23.67	371.09	4.3	1.01	0.31
	(428.79)	(57.71)	(10.79)	(1.98)	(7.78)	(1.42)	(170.41)	(93.4)	(452.65)	(6.64)	(2.97)	(0.62)
732 to 1,825	931.53	44.56	25.45	1.51	19.49	1.07	228.05	81.24	1219.93	11.9	3.31	0.84
	(849.05)	(126.94)	(21.11)	(4.18)	(15.48)	(2.84)	(388.31)	(281.97)	(1117.71)	(16.33)	(8.86)	(1.21)
0 to 1,825	2190.2	82.22	45.57	2.67	35.02	1.87	387.83	121.59	2621.73	21.66	5.29	2.29
	(1232.45)	(272.39)	(32.8)	(8.13)	(23.91)	(5.48)	(593.22)	(368.3)	(1612.31)	(25.19)	(12.37)	(1.61)
-271 to -1	492.03	3.9	21.08	0.15	16.69	0.09	47.7	1.74	539.31	2.04	0.11	0.65
	(281.47)	(27.75)	(11.33)	(0.98)	(8.41)	(0.57)	(103.68)	(18.24)	(329.39)	(3.57)	(0.7)	(1.1)
0 to 182	829.81	4.22	7.1	0.15	5.45	0.09	35.56	6.24	852.68	2.44	0.43	1.06
	(349.54)	(22.54)	(5.55)	(0.89)	(3.9)	(0.48)	(69.24)	(31.05)	(354.77)	(3.21)	(1.23)	(0.35)
183 to 365	88.43	3.71	3.02	0.13	2.41	0.08	42.33	5.52	149.23	2.41	0.34	0.07
	(155.54)	(25.71)	(4.68)	(0.94)	(3.36)	(0.59)	(103.5)	(26.6)	(229.8)	(3.87)	(1.12)	(0.31)
366 to 731	280.72	9.64	8.35	0.33	6.54	0.24	93.24	19.56	384.69	4.97	0.72	0.27
	(391.75)	(37.27)	(9.62)	(1.23)	(7.02)	(0.92)	(187.4)	(85.66)	(510.61)	(7.1)	(2.31)	(0.71)
732 to 1,825	907.08	51.87	26.07	1.82	19.74	1.14	492.98	83.61	1355.03	13.03	2.29	0.79
	(812.18)	(226.55)	(22.09)	(7.87)	(15.6)	(4.2)	(3021.41)	(623.23)	(3266.47)	(17.81)	(8.43)	(1.19)
0 to 1,825	2106.04	69.44	44.54	2.42	34.14	1.56	664.11	114.93	2741.62	22.85	3.78	2.19
	(1093.31)	(242.62)	(29.8)	(8.51)	(21.56)	(4.69)	(3129.27)	(657.24)	(3461.78)	(26.02)	(10.82)	(1.6)

Note: MH is for mental health. N hosp. indicates number of hospitalizations. N for 2000 is 491 for general acts and 125 for prescriptions; N for 2001 is 576 for general acts and 158 for prescriptions.

Table 6.3: Outcomes by sub-period, 1 week around breakpoint, 2005-2006

Interval in days	Cost $	Cost $ MH	Acts	Acts MH	Visits	Visits MH	Net cost of drugs $	Drugs MH $	Total cost $	N drugs	N drugs MH	N Hosp.
-271 to -1	461.99	2.72	20.94	0.11	15.89	0.06	101.95	10.17	558.31	2.48	0.33	0.56
	(269.93)	(18.93)	(10.02)	(0.8)	(6.71)	(0.4)	(367.8)	(102.73)	(553.64)	(5.88)	(2.13)	(0.98)
0 to 182	838.96	2.8	6.71	0.09	5.16	0.06	62.48	9.14	936.87	2.23	0.54	1.09
	(369.41)	(16.73)	(4.82)	(0.51)	(3.43)	(0.34)	(149.29)	(57.45)	(415.59)	(3.14)	(1.84)	(0.47)
183 to 365	95.04	4.57	3.43	0.18	2.5	0.12	80.21	4.4	168.41	1.92	0.2	0.07
	(207.69)	(34.97)	(5.8)	(1.58)	(3.73)	(1.13)	(613.45)	(31.72)	(777.1)	(3.91)	(0.81)	(0.3)
366 to 731	317.71	10.47	10.28	0.43	7.19	0.28	304.42	8.1	614.03	3.44	0.48	0.35
	(435.13)	(50.81)	(12.42)	(2.01)	(7.89)	(1.18)	(2887.53)	(42.02)	(2978.58)	(9.76)	(1.51)	(0.9)
732 to 1,825	945.68	51.2	27.44	1.82	19.15	1.06	433.04	21.37	1418.97	8.47	1.51	0.9
	(982.77)	(245.25)	(25)	(8.03)	(16.69)	(4.36)	(2516.34)	(75.67)	(3023.55)	(16.13)	(4.28)	(1.75)
0 to 1,825	2197.39	69.05	47.87	2.52	33.99	1.51	880.15	43.01	3138.29	16.06	2.74	2.41
	(1364.98)	(270.08)	(36.02)	(9.21)	(24.24)	(5.22)	(5878.68)	(139.7)	(6465.92)	(27.37)	(6.19)	(2.36)
-271 to -1	507.72	6.62	22.87	0.25	17.29	0.15	64.1	3.84	562.71	2.45	0.28	0.67
	(286.75)	(38.07)	(12.62)	(1.36)	(8.13)	(0.79)	(126.58)	(20.71)	(349.63)	(3.92)	(1.07)	(1.07)
0 to 182	845.19	6.86	7.43	0.26	5.56	0.17	58.07	9.09	952.81	2.52	0.55	1.1
	(390.89)	(43.11)	(5.92)	(1.69)	(4.03)	(1.03)	(100.51)	(42.39)	(451.44)	(3.36)	(1.89)	(0.44)
183 to 365	84.34	6.52	3.12	0.22	2.32	0.15	128.12	9.06	213.97	2.5	0.61	0.06
	(185.57)	(50.62)	(5.21)	(1.27)	(3.56)	(1.02)	(1026.19)	(38.88)	(1098.49)	(4.88)	(2.58)	(0.25)
366 to 731	294.54	11.04	9.46	0.42	6.6	0.27	208.17	19.21	483.12	4.54	1.16	0.32
	(413.92)	(45.25)	(11.38)	(1.63)	(7.21)	(1)	(1407.96)	(63.47)	(1533.96)	(7.92)	(3.24)	(0.71)
732 to 1,825	1049.2	59.02	30.03	2.05	20.52	1.23	358.36	70.01	1419.68	13.05	4.09	0.93
	(1047.15)	(211.03)	(29.08)	(6.59)	(18.56)	(4.06)	(1571.18)	(236.79)	(2104.07)	(23.08)	(10.14)	(1.4)
0 to 1,825	2273.27	83.44	50.04	2.94	35	1.82	752.72	107.37	3069.59	22.6	6.42	2.41
	(1335.88)	(269.73)	(37.49)	(8.91)	(24.51)	(5.63)	(3985.77)	(312.21)	(4554.94)	(34.93)	(15.07)	(1.79)

Note: Excludes 31 Dec. 2005; MH is for mental health. N hosp. indicates number of hospitalizations. N for 2005 is 470 for general acts and 133 for prescriptions; N for 2006 general acts 660 and 128 for prescriptions.

Table 7.1: Non-parametric local estimations for costs, acts and visits, 2000-2001, full sample

Period in days	Specification	Cost $	Acts	Cost-MH	Acts-MH	Visits	Visits-MH
Optimal Data-driven Bandwidth Selection							
-271 to -1	Conventional	17.06	-0.32	-1.83	-0.03	-0.02	-0.03
		(15.59)	(0.74)	(2.57)	(0.07)	(0.54)	(0.05)
0 to 182	Conventional	0.56	-0.76*	-13.32*	-0.35	-0.62**	-0.23*
		(26.72)	(0.4)	(7.97)	(0.22)	(0.3)	(0.14)
183 to 365	Conventional	-5.15	-0.22	-4.5*	-0.12	-0.1	-0.1**
		(9.42)	(0.29)	(2.34)	(0.08)	(0.22)	(0.05)
366 to 731	Conventional	-25.76	-0.8	-6.14*	-0.19*	-0.54	-0.14*
		(23.92)	(0.65)	(3.34)	(0.11)	(0.52)	(0.08)
732 to 1825	Conventional	2.72	1.34	17.5	0.69	0.68	0.28
		(64.48)	(1.49)	(13.59)	(0.45)	(1.17)	(0.26)
0 to 1825	Conventional	-51.88	-0.62	-5.5	0.05	-0.77	-0.2
		(90.22)	(2.07)	(16.11)	(0.5)	(1.73)	(0.31)
-271 to -1	BC robust	14.77	-0.58	-1.58	-0.02	-0.2	-0.02
		(18.54)	(0.85)	(3.1)	(0.09)	(0.62)	(0.06)
0 to 182	BC robust	-0.31	-0.92**	-15.74*	-0.41	-0.75**	-0.27*
		(32.22)	(0.45)	(9.2)	(0.26)	(0.34)	(0.16)
183 to 365	BC robust	-4.19	-0.22	-4.26	-0.11	-0.12	-0.09
		(11.16)	(0.35)	(2.76)	(0.09)	(0.27)	(0.06)
366 to 731	BC robust	-31.53	-1.02	-6.98*	-0.22*	-0.74	-0.16*
		(28.3)	(0.74)	(3.9)	(0.12)	(0.58)	(0.09)
732 to 1,825	BC robust	-15.65	1.34	17.62	0.69	0.44	0.28
		(75.93)	(1.79)	(16.4)	(0.54)	(1.39)	(0.31)
0 to 1,825	BC robust	-77.74	-1.14	-7.64	0.01	-1.37	-0.22
		(106.19)	(2.44)	(19.32)	(0.6)	(2)	(0.37)
With Double Bandwidth							
-271 to -1	Conventional	20.79*	0.4	-2.02	-0.04	0.4	-0.05
		(11.03)	(0.56)	(1.81)	(0.05)	(0.41)	(0.04)
0 to 182	Conventional	1.61	-0.2	-8.12	-0.21	-0.18	-0.15*
		(18.4)	(0.27)	(5.1)	(0.14)	(0.2)	(0.09)
183 to 365	Conventional	-8.41	-0.28	-4.61**	-0.14***	-0.12	-0.12***
		(6.83)	(0.21)	(1.92)	(0.05)	(0.16)	(0.04)
366 to 731	Conventional	-11.53	-0.14	-3.33	-0.11	0.12	-0.08
		(16.67)	(0.45)	(2.48)	(0.08)	(0.36)	(0.06)
732 to 1,825	Conventional	35.69	1.35	13.41	0.52*	1.13	0.19
		(45.51)	(1.06)	(9.81)	(0.31)	(0.83)	(0.19)
0 to 1,825	Conventional	13.87	0.58	-1.35	0.12	0.77	-0.09
		(63.77)	(1.49)	(11.39)	(0.35)	(1.23)	(0.22)
-271 to -1	BC robust	18.71	-0.36	-1.27	-0.02	-0.02	-0.01
		(16.16)	(0.77)	(2.73)	(0.07)	(0.57)	(0.05)
0 to 182	BC robust	3.64	-0.68*	-11.91	-0.33	-0.57*	-0.21
		(27.59)	(0.41)	(8.14)	(0.23)	(0.31)	(0.14)
183 to 365	BC robust	-4.29	-0.22	-5.13**	-0.13	-0.07	-0.12**
		(9.89)	(0.31)	(2.53)	(0.08)	(0.23)	(0.05)
366 to 731	BC robust	-14.72	-0.56	-6.11*	-0.21*	-0.43	-0.15*
		(24.77)	(0.67)	(3.62)	(0.11)	(0.53)	(0.08)
732 to 1,825	BC robust	11.46	1.62	20.06	0.79*	0.67	0.32
		(67.12)	(1.56)	(14.18)	(0.46)	(1.23)	(0.27)
0 to 1,825	BC robust	-52.01	-0.51	-1.47	0.14	-1.01	-0.16
		(94.11)	(2.16)	(16.89)	(0.52)	(1.81)	(0.33)

Note: Costs are the sum of medical fees; MH indicates mental health; BC indicates bias-corrected. See text for specification. Statistical significance: *=10%. **=5%; ***=1%.

Table 7.2: Non-parametric local estimations for costs, acts and visits, 2005-2006, full sample

Period in days	Specification	Cost $	Acts	Cost-MH $	Acts-MH	Visits	Visits-MH
Optimal Data-driven Bandwidth Selection							
-271 to -1	Conventional	52.27**	1.56*	4.03	0.16**	1.35**	0.11*
		(21.03)	(0.84)	(2.63)	(0.08)	(0.59)	(0.06)
0 to 182	Conventional	45.78*	0.5	2.39	0.14*	0.41	0.09
		(26.1)	(0.4)	(2.39)	(0.08)	(0.29)	(0.06)
183 to 365	Conventional	-10.33	-0.19	0.27	-0.02	-0.07	0.02
		(11.85)	(0.29)	(2.31)	(0.11)	(0.23)	(0.06)
366 to 731	Conventional	-20.28	-1.18	-0.06	-0.01	-0.62	-0.01
		(28.34)	(0.83)	(2.95)	(0.12)	(0.54)	(0.08)
732 to 1,825	Conventional	103.55	1.74	15.57	0.49	1.52	0.32
		(67.18)	(1.62)	(12.6)	(0.4)	(1.23)	(0.23)
0 to 1,825	Conventional	114.6	1.1	22	0.71	1.27	0.45
		(89.79)	(2.25)	(14.75)	(0.52)	(1.71)	(0.33)
-271 to -1	BC robust	58.15**	1.79*	4.62	0.19*	1.52**	0.13*
		(24.75)	(0.99)	(3.18)	(0.1)	(0.69)	(0.07)
0 to 182	BC robust	54.11*	0.41	1.62	0.11	0.36	0.08
		(30.23)	(0.48)	(2.75)	(0.1)	(0.35)	(0.07)
183 to 365	BC robust	-13.26	-0.17	-0.09	-0.05	-0.09	0.01
		(13.91)	(0.35)	(2.69)	(0.13)	(0.28)	(0.07)
366 to 731	BC robust	-22.74	-1.34	-0.45	-0.01	-0.72	-0.02
		(33.73)	(0.97)	(3.37)	(0.15)	(0.63)	(0.09)
732 to 1,825	BC robust	120.3	2.16	15.87	0.52	1.79	0.34
		(78.8)	(1.91)	(14.68)	(0.47)	(1.45)	(0.27)
0 to 1,825	BC robust	132.59	1.19	22.09	0.72	1.35	0.44
		(106.55)	(2.71)	(17.07)	(0.61)	(2.05)	(0.39)
With Double Bandwidth							
-271 to -1	Conventional	33.43**	0.82	2.33	0.09	0.77*	0.07*
		(14.99)	(0.6)	(1.87)	(0.06)	(0.42)	(0.04)
0 to 182	Conventional	22.03	0.65**	5.16**	0.24***	0.42**	0.14***
		(17.93)	(0.28)	(2.07)	(0.08)	(0.21)	(0.05)
183 to 365	Conventional	-5.47	-0.19	1.07	0.03	-0.12	0.01
		(8.15)	(0.19)	(1.7)	(0.07)	(0.16)	(0.04)
366 to 731	Conventional	-20.84	-0.76	0.53	-0.03	-0.39	-0.01
		(19.73)	(0.57)	(2.37)	(0.09)	(0.38)	(0.06)
732 to 1,825	Conventional	42.49	0.38	12.53	0.35	0.57	0.22
		(47.03)	(1.14)	(9.2)	(0.29)	(0.85)	(0.17)
0 to 1,825	Conventional	45.99	0.09	17.58	0.58	0.48	0.43*
		(62.34)	(1.54)	(11.03)	(0.38)	(1.18)	(0.24)
-271 to -1	BC robust	51.53**	1.41	3.67	0.14*	1.25**	0.13
		(22.29)	(0.9)	(2.71)	(0.08)	(0.63)	(0.08)
0 to 182	BC robust	49.19*	0.66	1.79	0.15*	0.46	0.09
		(26.96)	(0.42)	(2.55)	(0.09)	(0.31)	(0.06)
183 to 365	BC robust	-8.14	-0.3	0.02	-0.01	-0.05	0.03
		(12.29)	(0.29)	(2.39)	(0.11)	(0.24)	(0.06)
366 to 731	BC robust	-14.74	-1.02	0.46	-0.02	-0.51	-0.02
		(29.31)	(0.85)	(3.2)	(0.13)	(0.56)	(0.08)
732 to 1,825	BC robust	103.67	1.73	16.66	0.54	1.35	0.37
		(69.23)	(1.68)	(13.02)	(0.41)	(1.26)	(0.24)
0 to 1,825	BC robust	127.49	1.31	23.73	0.76	1.28	0.47
		(92.85)	(2.32)	(15.32)	(0.54)	(1.76)	(0.34)

Note: Costs are the sum of medical fees; MH indicates mental health; BC indicates bias-corrected. See text for specification. Statistical significance: *=10%. **=5%; ***=1%.

Table 7.3: Non-parametric local estimations associated with hospitalization, 2000-2001, full sample

Period in days	Specification	Cost $	Acts	Cost-MH $	Acts-MH	Hospitalization
Optimal Data-driven Bandwidth Selection						
-271 to -1	Conventional	15.29	0.62	-0.24	0	-0.01
		(9.44)	(0.41)	(0.28)	(0.01)	(0.07)
0 to 182	Conventional	6.33	-0.4	-4.89	-0.19	0.01
		(23.61)	(0.25)	(3.46)	(0.14)	(0.03)
183 to 365	Conventional	2.89	0.07	-0.13**	0	0
		(4.99)	(0.08)	(0.06)	(0)	(0.02)
366 to 731	Conventional	-12.58	-0.05	-0.51	-0.02	-0.05
		(15.76)	(0.16)	(0.53)	(0.02)	(0.04)
732 to 1,825	Conventional	-44.99	0.13	-2.29**	-0.06	-0.03
		(40.56)	(0.5)	(1.01)	(0.04)	(0.08)
0 to 1,825	Conventional	-47.48	-0.24	-3.34	-0.12	-0.07
		(53.68)	(0.63)	(3.49)	(0.14)	(0.1)
-271 to -1	BC robust	15.42	0.6	-0.24	0	-0.01
		(11.21)	(0.46)	(0.31)	(0.01)	(0.09)
0 to 182	BC robust	7.03	-0.48*	-5.81	-0.23	0.01
		(28.46)	(0.29)	(4.14)	(0.17)	(0.03)
183 to 365	BC robust	4.3	0.08	-0.14*	0	0.01
		(5.76)	(0.09)	(0.08)	(0)	(0.02)
366 to 731	BC robust	-16.35	-0.09	-0.68	-0.03	-0.05
		(18.61)	(0.19)	(0.58)	(0.02)	(0.05)
732 to 1,825	BC robust	-60.12	0.01	-2.68**	-0.07*	-0.04
		(46.52)	(0.6)	(1.15)	(0.04)	(0.09)
0 to 1,825	BC robust	-64.47	-0.39	-4.16	-0.15	-0.08
		(62.8)	(0.74)	(4.05)	(0.16)	(0.12)
With Double Bandwidth						
-271 to -1	Conventional	12.41*	0.67**	-0.26	-0.01	0.03
		(6.78)	(0.34)	(0.26)	(0.01)	(0.05)
0 to 182	Conventional	3.39	-0.12	-2.95	-0.11	0
		(16.51)	(0.17)	(2.12)	(0.09)	(0.02)
183 to 365	Conventional	-0.57	0.01	-0.1	0	-0.01
		(3.64)	(0.07)	(0.13)	(0)	(0.01)
366 to 731	Conventional	-4.65	0.05	0.08	0	-0.03
		(11.39)	(0.14)	(0.44)	(0.02)	(0.03)
732 to 1,825	Conventional	-7.62	0.25	0.99	0.02	-0.01
		(28.37)	(0.34)	(1.35)	(0.04)	(0.05)
0 to 1,825	Conventional	-6.87	0.09	-1.37	-0.05	-0.05
		(37.61)	(0.46)	(2.35)	(0.09)	(0.07)
-271 to -1	BC robust	16.05	0.63	-0.19	-0.01	-0.02
		(9.82)	(0.43)	(0.3)	(0.01)	(0.07)
0 to 182	BC robust	11.77	-0.39	-4.57	-0.18	0.01
		(24.45)	(0.26)	(3.53)	(0.14)	(0.03)
183 to 365	BC robust	3.13	0.06	-0.09	-0.01	0
		(5.24)	(0.09)	(0.1)	(0)	(0.02)
366 to 731	BC robust	-10.34	-0.11	-0.6	-0.03	-0.03
		(16.39)	(0.18)	(0.57)	(0.02)	(0.04)
732 to 1,825	BC robust	-35.17	0.23	-2**	-0.04	-0.03
		(42.09)	(0.51)	(0.93)	(0.03)	(0.08)
0 to 1,825	BC robust	-37.72	-0.24	-2.95	-0.11	-0.04
		(55.84)	(0.66)	(3.58)	(0.14)	(0.1)

Note: Costs are the sum of medical fees; MH indicates mental health; BC indicates bias-corrected. See text for specification. Statistical significance: *=10%. **=5%; ***=1%.

Table 7.4: Non-parametric local estimations associated with hospitalization, 2005-2006, full sample

Period in days	Specification	Cost $	Acts	Cost-MH $	Acts-MH	Hospitalization
Optimal Data-driven Bandwidth Selection						
-271 to -1	Conventional	17.44*	0.48	0.07	0	0.09
		(10.04)	(0.32)	(0.13)	(0.01)	(0.07)
0 to 182	Conventional	56.81**	0.22	0.41	0.01	-0.02
		(26)	(0.24)	(0.48)	(0.03)	(0.03)
183 to 365	Conventional	-9.08	-0.1	-0.06	0	-0.01
		(6.51)	(0.1)	(0.29)	(0.01)	(0.02)
366 to 731	Conventional	-7.69	0.12	-0.08	-0.01	0.01
		(16.4)	(0.18)	(0.05)	(0)	(0.05)
732 to 1,825	Conventional	64.92*	0.7	2.57	0.06	0.02
		(38.56)	(0.57)	(1.59)	(0.04)	(0.1)
0 to 1,825	Conventional	105.45*	0.87	2.82	0.07	0.04
		(53.85)	(0.71)	(1.74)	(0.05)	(0.15)
-271 to -1	BC robust	21.2*	0.58	0.1	0	0.1
		(11.44)	(0.37)	(0.13)	(0.01)	(0.08)
0 to 182	BC robust	67.29**	0.16	0.29	0	-0.03
		(29.91)	(0.28)	(0.52)	(0.03)	(0.04)
183 to 365	BC robust	-11.56	-0.13	-0.05	0	-0.01
		(7.26)	(0.12)	(0.31)	(0.01)	(0.02)
366 to 731	BC robust	-5.27	0.15	-0.14**	-0.01	0.02
		(19.46)	(0.22)	(0.06)	(0)	(0.06)
732 to 1,825	BC robust	75.63*	0.86	3.06*	0.06	0.05
		(45.03)	(0.67)	(1.74)	(0.05)	(0.12)
0 to 1,825	BC robust	124.89**	0.92	3.14	0.05	0.05
		(62.74)	(0.85)	(1.92)	(0.06)	(0.18)
With Double Bandwidth						
-271 to -1	Conventional	3.49	0.08	0.2*	0	0.06
		(7.93)	(0.26)	(0.12)	(0)	(0.05)
0 to 182	Conventional	29.61*	0.39**	1.15	0.05*	0.01
		(17.94)	(0.18)	(0.76)	(0.03)	(0.02)
183 to 365	Conventional	-2.1	-0.04	0.06	-0.01	0.01
		(4.83)	(0.06)	(0.31)	(0.01)	(0.01)
366 to 731	Conventional	-15.75	0.05	-0.11	-0.01	-0.01
		(11.54)	(0.14)	(0.14)	(0.01)	(0.04)
732 to 1,825	Conventional	27.49	0.19	1	0.05*	-0.04
		(27.88)	(0.4)	(1.33)	(0.03)	(0.07)
0 to 1,825	Conventional	51.11	0.55	3.38*	0.15**	-0.01
		(38.8)	(0.48)	(1.88)	(0.06)	(0.09)
-271 to -1	BC robust	15.6	0.37	0.11	0.01	0.11
		(10.92)	(0.37)	(0.15)	(0.01)	(0.07)
0 to 182	BC robust	61.01**	0.33	0.42	0.01	-0.01
		(27.15)	(0.25)	(0.62)	(0.03)	(0.03)
183 to 365	BC robust	-9.56	-0.05	0.1	0	0
		(6.86)	(0.11)	(0.36)	(0.01)	(0.02)
366 to 731	BC robust	-6.88	0.13	-0.16	-0.01	0.02
		(16.99)	(0.19)	(0.14)	(0.01)	(0.05)
732 to 1,825	BC robust	64.5	0.74	3.32*	0.1**	0.04
		(40.33)	(0.59)	(1.85)	(0.05)	(0.1)
0 to 1,825	BC robust	112.53**	1.08	4.31*	0.09	0.09
		(56.84)	(0.73)	(2.24)	(0.06)	(0.15)

Note: Costs are the sum of medical fees; MH indicates mental health; BC indicates bias-corrected. See text for specification. Statistical significance: *=10%. **=5%; ***=1%.

Table 7.5: Non-parametric local estimations for net public costs of prescription drugs (all and type) and associated physician fees, 2000-2001, full sample

Period in days	Specification	Net Cost Drugs	Net Cost Drugs-MH	Total cost	N drugs	N drugs-MH
Optimal Data-driven Bandwidth Selection						
-271 to -1	Conventional	-65.27	-1.55	-30	-0.35	-0.09
		(53.71)	(1.47)	(69.53)	(0.71)	(0.09)
0 to 182	Conventional	8.45	-2.36	-59.56	0.11	-0.12
		(8.95)	(3.78)	(59.17)	(0.48)	(0.26)
183 to 365	Conventional	-4.17	-6.66	3.93	-0.24	-0.13
		(15.43)	(4.83)	(34.5)	(0.58)	(0.17)
366 to 731	Conventional	27.56	-17.03	-17.69	-0.04	-0.71*
		(36.47)	(12.86)	(61.37)	(0.98)	(0.41)
732 to 1,825	Conventional	29.45	-13.17	61.34	0.95	-1.27
		(159.14)	(60.71)	(201.12)	(2.44)	(1.29)
0 to 1,825	Conventional	144.08	-39.21	13.68	0.84	-2.37
		(165.25)	(69.59)	(250.54)	(3.56)	(1.72)
-271 to -1	BC robust	-80.15	-2.05	-53.83	-0.56	-0.12
		(65.09)	(1.62)	(81.66)	(0.84)	(0.1)
0 to 182	BC robust	9.5	-3.64	-74.54	0.04	-0.2
		(10.75)	(4.53)	(69.03)	(0.58)	(0.31)
183 to 365	BC robust	-4.74	-7.04	7.35	-0.28	-0.15
		(18.77)	(5.72)	(41.93)	(0.7)	(0.21)
366 to 731	BC robust	34.21	-20.91	-19.22	-0.3	-0.83*
		(43.18)	(15.48)	(72.37)	(1.17)	(0.48)
732 to 1,825	BC robust	8.26	8.02	6	1.02	-1.32
		(176.47)	(69.5)	(223.4)	(2.87)	(1.52)
0 to 1,825	BC robust	121.39	-20.96	2.15	0.34	-2.58
		(183.45)	(81.2)	(289.11)	(4.22)	(2.03)
With Double Bandwidth						
-271 to -1	Conventional	-22.64	0.03	23.03	0.08	0
		(30.27)	(1.39)	(42.62)	(0.43)	(0.07)
0 to 182	Conventional	9.8	0.84	-6.21	0.25	0.05
		(6.15)	(2.37)	(41.2)	(0.33)	(0.16)
183 to 365	Conventional	-1.69	-4.24	-1.15	-0.01	-0.05
		(10.51)	(3.3)	(22.24)	(0.38)	(0.12)
366 to 731	Conventional	-6.15	-6.59	-27.32	0.62	-0.31
		(27.38)	(8.14)	(50.5)	(0.67)	(0.28)
732 to 1,825	Conventional	108.73	-45.97	130	0.32	-1.27
		(137.65)	(46.16)	(185.15)	(1.88)	(0.96)
0 to 1,825	Conventional	99.45	-60.04	73.45	1.26	-1.63
		(179.38)	(50.74)	(229.47)	(2.65)	(1.25)
-271 to -1	BC robust	-66.82	-1.97	-11.93	-0.21	-0.09
		(54.83)	(1.77)	(70.49)	(0.72)	(0.1)
0 to 182	BC robust	8.78	-1.79	-65.99	0.11	-0.11
		(8.43)	(3.89)	(62.29)	(0.5)	(0.26)
183 to 365	BC robust	2.27	-5.93	8.56	-0.3	-0.17
		(17.11)	(5.12)	(35.98)	(0.61)	(0.18)
366 to 731	BC robust	23.68	-17.62	-22.72	-0.03	-0.82*
		(38.25)	(13.34)	(65.67)	(1.01)	(0.43)
732 to 1,825	BC robust	63.09	-23.19	-83.58	0.29	-1.55
		(172.39)	(67.38)	(229.51)	(2.58)	(1.38)
0 to 1,825	BC robust	13.17	-52.87	-161.91	0.2	-2.66
		(194.84)	(75.6)	(282.31)	(3.75)	(1.83)

Note: Net Cost Drugs are drug prices less patient contributions; N indicates number; MH indicates mental health;
BC indicates bias-corrected. Total Costs are the sum of drug and physician fees. Statistical significance: *=10%. **=5%; ***=1%.

Table 7.6: Non-parametric local estimations for net public costs of prescription drugs (all and type) and associated physician fees, 2005-2006, full sample

Period in days	Specification	Net Cost Drugs	Net Cost Drugs-MH	Total cost	N drugs	N drugs-MH
Optimal Data-driven Bandwidth Selection						
-271 to -1	Conventional	-57.67**	-4.97	-12.4	-0.8	-0.1
		(27.35)	(4.58)	(52.73)	(0.67)	(0.17)
0 to 182	Conventional	9.82	0.25	-25.76	-0.05	0.07
		(13.69)	(3.2)	(54.45)	(0.42)	(0.18)
183 to 365	Conventional	55.88	9.42**	40.96	0.7	0.5**
		(52.89)	(4.22)	(63.96)	(0.49)	(0.2)
366 to 731	Conventional	53.71	21.03***	-176.06	1.76*	1.1***
		(139.47)	(7.32)	(197.37)	(0.97)	(0.33)
732 to 1,825	Conventional	60.93	49.4*	-65.73	7.11**	2.51**
		(200.77)	(26.15)	(307.64)	(2.83)	(1.11)
0 to 1,825	Conventional	196.96	70.5**	-219.15	9.44**	4.08***
		(339.18)	(32.67)	(509.48)	(4.01)	(1.55)
-271 to -1	BC robust	-61.81*	-5.86	-28.75	-0.84	-0.15
		(32.46)	(5.32)	(61.28)	(0.81)	(0.19)
0 to 182	BC robust	13.98	0.15	-31.34	-0.05	0.06
		(15.36)	(3.73)	(64.54)	(0.5)	(0.22)
183 to 365	BC robust	75.03	8.24*	53.92	0.77	0.51**
		(61.55)	(4.87)	(78.06)	(0.58)	(0.22)
366 to 731	BC robust	43.15	18.02**	-242.46	1.9*	1.13***
		(156.12)	(8.63)	(215.7)	(1.14)	(0.37)
732 to 1,825	BC robust	57.35	60.04**	-96.92	8.01**	2.81**
		(238.16)	(29.47)	(359.48)	(3.26)	(1.26)
0 to 1,825	BC robust	161.64	74.57**	-343.85	10.79**	4.39**
		(378.84)	(37.91)	(561.56)	(4.57)	(1.77)
With Double Bandwidth						
-271 to -1	Conventional	-35.23*	-2.49	34.39	-0.41	0
		(20.33)	(3.27)	(38.23)	(0.47)	(0.12)
0 to 182	Conventional	2.92	0.02	7.9	0.06	0.08
		(10.32)	(2.29)	(39.09)	(0.31)	(0.12)
183 to 365	Conventional	13.49	10.01**	14.11	0.28	0.34**
		(34.72)	(4.11)	(40.35)	(0.34)	(0.15)
366 to 731	Conventional	-3.09	20.42***	-72.45	1.01	0.95***
		(119.55)	(7.48)	(146.15)	(0.69)	(0.29)
732 to 1,825	Conventional	85.79	62.13*	55.88	5.24**	1.91*
		(165.98)	(35.36)	(246.75)	(2.15)	(1.04)
0 to 1,825	Conventional	119.99	95.25**	-31.14	6.15**	3.35**
		(296.37)	(43.81)	(398.78)	(3.02)	(1.43)
-271 to -1	BC robust	-57.47*	-6.47	-35.45	-0.95	-0.09
		(29.34)	(4.84)	(55.7)	(0.71)	(0.18)
0 to 182	BC robust	17.95	1.3	-32.45	-0.05	0.1
		(15.22)	(3.6)	(56.52)	(0.45)	(0.19)
183 to 365	BC robust	48.92	6.12	42.1	0.79	0.6***
		(54.73)	(4.92)	(65.65)	(0.51)	(0.22)
366 to 731	BC robust	4.41	14.55	-113.88	2.08**	1.32***
		(171.41)	(9.76)	(205.53)	(1.01)	(0.36)
732 to 1,825	BC robust	-19.18	71.78	-37.14	8.96***	3.35***
		(213.84)	(46.9)	(338.61)	(2.99)	(1.26)
0 to 1,825	BC robust	135.42	120.9*	-23.79	11.36***	5.27***
		(378.46)	(68.85)	(537.6)	(4.28)	(1.77)

Note: Costs are the sum of medical fees; MH indicates mental health; BC indicates bias-corrected. See text for specification. Statistical significance: *=10%. **=5%; ***=1%.

Table 8.1: Parametric regression discontinuity results for costs, acts and visits of physicians by period, 2000-2001 and 2005-2006

Period (days)	Cost	Acts	Cost-MH	Acts-MH	Visits	Visits-MH
A. Delivering mothers 2000 (25-31 Dec.) and 2001 (1-7 Jan.) N=1067						
-271 to -1	12.46	-0.19	-1.31	-0.02	0.12	-0.02
	(16.27)	(0.64)	(1.86)	(0.06)	(0.47)	(0.04)
0 to 182	-15.15	-0.57	-11.01	-0.28	-0.45	-0.19
	(22.48)	(0.4)	(7.09)	(0.2)	(0.28)	(0.12)
183 to 365	-1.25	-0.22	-3.75**	-0.11*	-0.06	-0.09**
	(9.17)	(0.29)	(1.87)	(0.06)	(0.21)	(0.04)
366 to 731	-42.67*	-1.03*	-4.53	-0.15	-0.57	-0.1
	(24.9)	(0.61)	(2.93)	(0.1)	(0.45)	(0.07)
732 to 1,825	-20.02	0.56	9.02	0.33	0.37	0.11
	(50.22)	(1.27)	(11.31)	(0.38)	(0.93)	(0.22)
0 to 1,825	-79.09	-1.26	-10.28	-0.22	-0.72	-0.25
	(68.64)	(1.76)	(15.38)	(0.49)	(1.32)	(0.3)
B. Delivering mothers 2005 (24-30 Dec.) and 2006 (1-7 Jan.) N=1130						
-271 to -1	44.9***	1.84***	3.62*	0.14**	1.39***	0.09**
	(16.69)	(0.67)	(1.85)	(0.07)	(0.45)	(0.04)
0 to 182	14.24	0.59*	3.74*	0.17**	0.33	0.11**
	(22.59)	(0.33)	(2.03)	(0.08)	(0.23)	(0.05)
183 to 365	-14.55	-0.45	0.34	0.02	-0.27	0.02
	(11.78)	(0.33)	(2.52)	(0.09)	(0.22)	(0.07)
366 to 731	-32.38	-1.27*	0.23	-0.03	-0.79*	-0.01
	(25.39)	(0.7)	(2.86)	(0.11)	(0.45)	(0.07)
732 to 1825	100.85*	1.69	7.6	0.24	1.09	0.19
	(59.9)	(1.58)	(13.52)	(0.44)	(1.04)	(0.26)
0 to 1825	68.15	0.55	11.91	0.4	0.36	0.3
	(77.43)	(2.07)	(15.72)	(0.54)	(1.4)	(0.33)

Note: Costs are the sum of medical fees; MH indicates mental health. Controls are: a treatment dummy indicating the first week of January, lag measure of costs before conception (day-271) for period 1 and during pregnancy for subsequent periods; dummies for age groups (5) of mothers and 16 administrative regions. Statistical significance: *=10%, **=5%, ***=1%.

Table 8.2: Parametric regression discontinuity results for costs and acts (all and type) associated with hospitalization by period, 2000-2001 and 2005-2006

Period in days	Cost	Acts	Cost-MH	Acts-MH	Hospitalization
A. Delivering mothers 2000 (25-31 Dec.) and 2001 (1-7 Jan.) N=1067					
-271 to -1	9.29	0.36	-0.52	-0.02	0.01
	(9.22)	(0.34)	(0.41)	(0.02)	(0.06)
0 to 182	-14.56	-0.32	-4.48	-0.17	-0.01
	(19.99)	(0.24)	(3.32)	(0.14)	(0.02)
183 to 365	2.63	0.03	-0.12	0	0
	(4.86)	(0.08)	(0.11)	(0)	(0.02)
366 to 731	-17.81	-0.07	-0.51	-0.02	-0.04
	(14.54)	(0.16)	(0.46)	(0.02)	(0.04)
732 to 1,825	-41.49	-0.04	-0.67	-0.02	-0.06
	(30.53)	(0.4)	(0.64)	(0.02)	(0.07)
0 to 1,825	-71.22*	-0.4	-5.78*	-0.21	-0.11
	(41.34)	(0.54)	(3.41)	(0.14)	(0.1)
B. Delivering mothers 2005 (24-30 Dec.) and 2006 (1-7 Jan.) N=1130					
-271 to -1	5.17	0.43	0.11	0	0.13**
	(8.8)	(0.28)	(0.12)	(0.01)	(0.06)
0 to 182	15.38	0.31*	0.37	0.02	0
	(21.4)	(0.18)	(0.43)	(0.02)	(0.03)
183 to 365	-8.97	-0.13	0	0	-0.01
	(6.26)	(0.09)	(0)	(0)	(0.02)
366 to 731	-16.92	-0.03	0.06	0	-0.04
	(15.38)	(0.17)	(0.09)	(0.01)	(0.05)
732 to 1,825	59.59*	0.59	1.68	0.05	0.04
	(32.8)	(0.54)	(1.28)	(0.03)	(0.09)
0 to 1,825	49.08	0.74	2.11	0.07*	-0.01
	(43.8)	(0.63)	(1.35)	(0.04)	(0.12)

Note: Costs are the sum of medical fees; MH indicates mental health; hospitalization indicates length in days. The list of control variables is provided in the notes in Table 8.1. Statistical significance: *=10%, **=5%, ***=1%.

Table 8.3: Parametric regression discontinuity results for net public costs of prescription drugs (all and type) and associated physician fees by period, 2000-2001 and 2005-2006

Period in days	Net Cost Drugs	Net Cost Drugs-MH	Total cost	Number drugs	Number drugs-MH
A. Delivering mothers 2000 (25-31 Dec.) and 2001 (1-7 Jan.) N=283					
-271 to -1	-29	0.53	-2.75	-0.45	-0.02
	(33.73)	(1.76)	(52.59)	(0.5)	(0.08)
0 to 182	2.15	-1.06	-29.26	-0.11	-0.11
	(8.29)	(4.28)	(47.73)	(0.42)	(0.25)
183 to 365	-5.21	-3.74	-9	-0.45	-0.09
	(13)	(4.09)	(30.48)	(0.48)	(0.16)
366 to 731	13.77	-4.3	11.24	0.74	-0.25
	(21.83)	(10.89)	(58.87)	(0.83)	(0.32)
732 to 1,825	264.29	-13.36	138.99	1.37	-1.13
	(283.87)	(61.62)	(317.72)	(2.06)	(1.02)
0 to 1,825	275	-22.46	111.97	1.55	-1.58
	(295.38)	(67.12)	(346.15)	(3.03)	(1.37)
B. Delivering mothers 2005 (24-30 Dec.) and 2006 (1-7 Jan.) N=261					
-271 to -1	-28.27	-3.27	26.32	0.07	0.01
	(21.93)	(8.61)	(42.35)	(0.55)	(0.19)
0 to 182	5.62	3.42	52.69	0.36	0.11
	(11.92)	(5.55)	(48.03)	(0.38)	(0.22)
183 to 365	90.38	7.27*	96.11	0.8	0.5**
	(90.74)	(4.32)	(97.25)	(0.49)	(0.24)
366 to 731	64.26	14.2**	36.11	1.65**	0.82***
	(180.45)	(6.59)	(189.8)	(0.84)	(0.31)
732 to 1,825	56	54.69**	179.67	5**	2.94***
	(199.36)	(21.85)	(262.94)	(2.32)	(0.94)
0 to 1,825	216.26	79.59***	364.59	7.81**	4.38***
	(431.43)	(28.85)	(475.28)	(3.36)	(1.38)

Notes: Net Cost Drugs are drug prices less patient contributions; MH indicates mental health; Total costs are the sum of drugs and physician fees. The list of control variables is provided in the notes in Table 8.1. Statistical significance: *=10%, **=5%, ***=1%.

Table 9: Summary statistics on mothers' medical acts, prescription drugs, and births, by selected year-period

	1998 Oct-Dec	1999 Jan-March	2000 Oct-Dec	2001 Jan-March	2005 Oct-Dec	2006 Jan-March
Medical acts						
Acts (7 years) N	691,775	710,010	674,917	744,164	709,943	755,856
Total cost (7 years) $	$24.4 m	$25.8 m	$25.2 m	$28.3 m	$31.1 m	$33.2 m
Mean cost per act $	$35.3	$36.4	$37.3	$38.0	$43.9	$43.9
Mothers N	8,861	9,139	8,553	9,447	8,702	9,298
Cost per mother (7 years) $	2,754	2,823	2,946	2,996	3,574	3,571
Prescription drugs						
Net cost drugs (7 years) $	145,119	152,511	149,546	156,620	149,698	149,537
Mothers eligible at birth N	3,403	3,433	3,209	3,327	2,895	2,913
Cost per mother (7 years) $	$42.6	$44.4	$46.6	$47.1	$51.7	$51.4
Births						
Total births same 3 months	17,439	17,206	16,316	17,436	18,091	20,175
Total births by year	75,865	73,599	72,010	73,699	76,341	81,962

Note: m = million nominal $.
Sources: Authors' calculation from RAMQ data sets; annual births from Québec's Institute of Statistics.

Table 10: Summary financial statistics of parental leave programs (millions of nominal dollars), births and coverage, for selected years

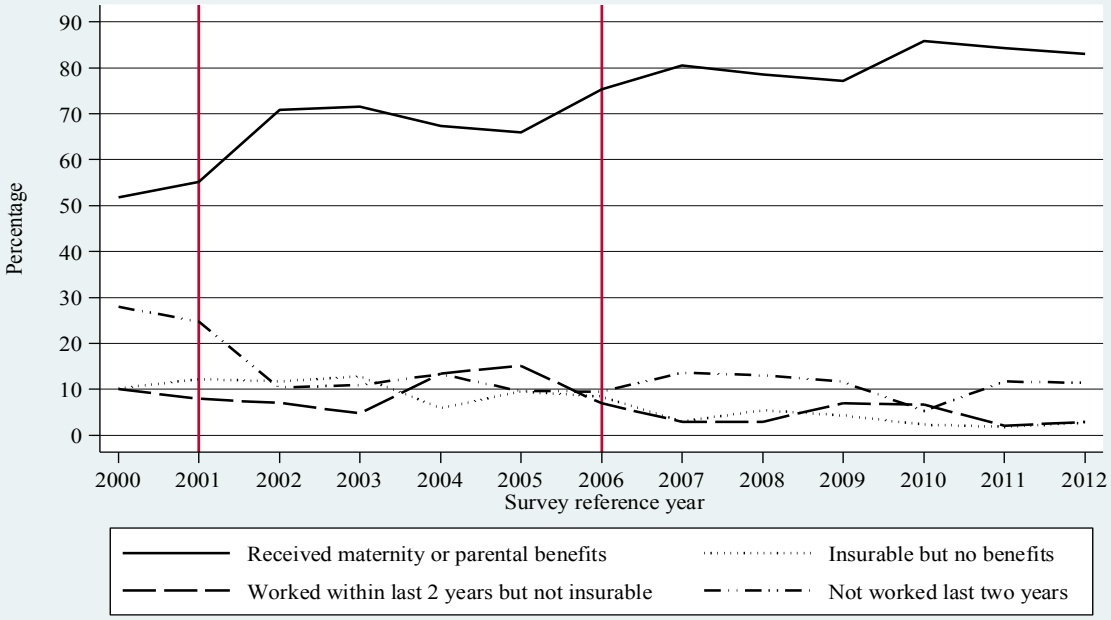
	1998	2000	2001	2005		2006	2007	2008	2009	2010	2011	2012	2013
	Federal program					**Québec program**							
Benefits	255	278	399	722		1,176#	1,451	1,561	1,649	1,697	1,732	1,803	1,900
Payroll taxes	N.A	N.A	N.A	N.A		1,184#	1,233	1,344	1,511	1,624	1,802	1,929	2,018
Operating cost	N.A	N.A	N.A	N.A		31	36	44	42	41	40	37	39
Current Deficit	0	0	0	0		-23	-236	-252	-180	-110	+13	+74	+102
Cumulated deficit	0	0	0	0		23	32##	284	464	591	578	504	448
Insurable earnings	39,000	39,000	39,000	39,000		57,000	59,000	60,500	62,000	62,500	64,000	66,000	67,500
Premium employees	-	-	-	0.340*		0.416	0.416	0.450	0.484	0.506	0.537	0.559	0.559
Premium employers	-	-	-	0.476*		0.583	0.583	0.630	0.677	0.708	0.752	0.782	0.782
Premium self-employed	0	0	0	0*		0.737	0.737	0.800	0.860	0.889	0.955	0.993	0.993
Births	75,865	72,010	73,699	76,341		81,962	84,200	87,600	88,600	88,300	88,500	88,700	88,600
Mothers with benefits	37,174	37,301	40,608	50,309		65,130	63,598	67,426	69,289	68,312	68,924	70,380	68,945
Coverage %	49.0	51.8	55.1	65.9		79.5	75.5	77.0	78.2	77.4	77.8	79.3	77.8
Benefits per mother	6,860	7,453	9,826	14,351		21,188	22,815	23,151	23,799	24,842	25,129	25,618	27,558

Sources: Financial statistics derived from the Actuary's annual report of the QPIP; annual births from Québec's Institute of Statistics; coverage and other statistics, authors' calculation from Statistics Canada's Employment Insurance Coverage Survey and Employment Insurance Benefits, and published administrative data from QPIP.
Notes: Benefits include all maternal (maternity, adoption) and parental benefits. N.A.: Not available. The federal government does not present programs or payroll taxes for each EI subprogram. The Employment Insurance Act requires a premium rate to be set annually to ensure that EI cumulative revenues and expenditures break even after December 31. Over the whole 2000 decade, premium revenues were higher that program costs and decreased almost every year. Mothers with benefits include adopting mothers (around 500-600 per year). Benefits per mother are for covered mothers. #The figures do not take into account the financial aspects of the agreement between the federal and Québec governments to devolve the parental leave program which had three clauses: a) the federal government would lend 200 million $ to help Québec start the implementation of the program; b) Québec would pay in 2006 the

benefits according to the federal 2005 parameters to mothers/parents who were still eligible for benefits in 2006 (e.g. mothers delivering in December 2005); c) Québec would repay the total loan, established at 346.6 million $ at the end/start of 2006-2007, to the federal government without interest after agreeing on a schedule beginning on 2009. Maybe because of the financial crisis, it is only in January 5th 2011 that Québec (considered as the debtor) reimburse totally the loan (adding the amount to Québec's public debt). In 2014, the government decided that the regime would repay each year the debt with interests to the tune of 94 million dollars. ##For this year the balance sheet includes as revenue the 200 million $ from the federal government. *These are notional premiums/$100 estimated by the federal government to finance the leave program (including operation costs); Québec's taxpayer's wage earners and employers were given this rebate on EI federal contributions.

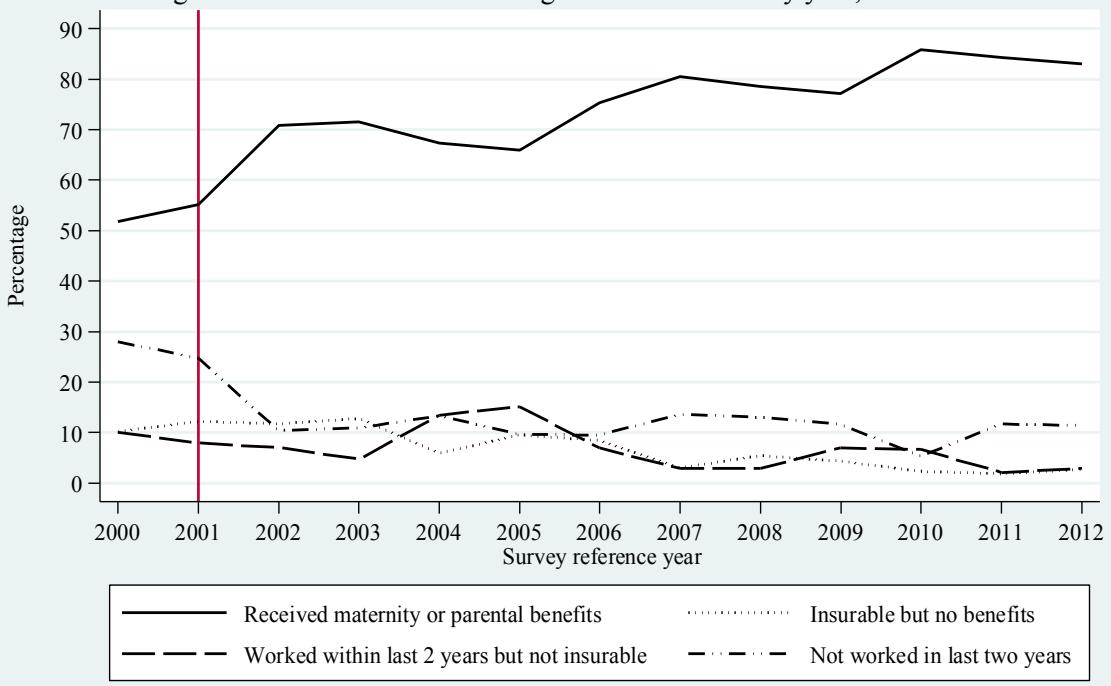
Figure 1: Mothers with a child age 0 to 12 months by year, Québec and Rest of Canada

Figure 1A: Mothers with a child aged 0 to 12 months by year, Quebec



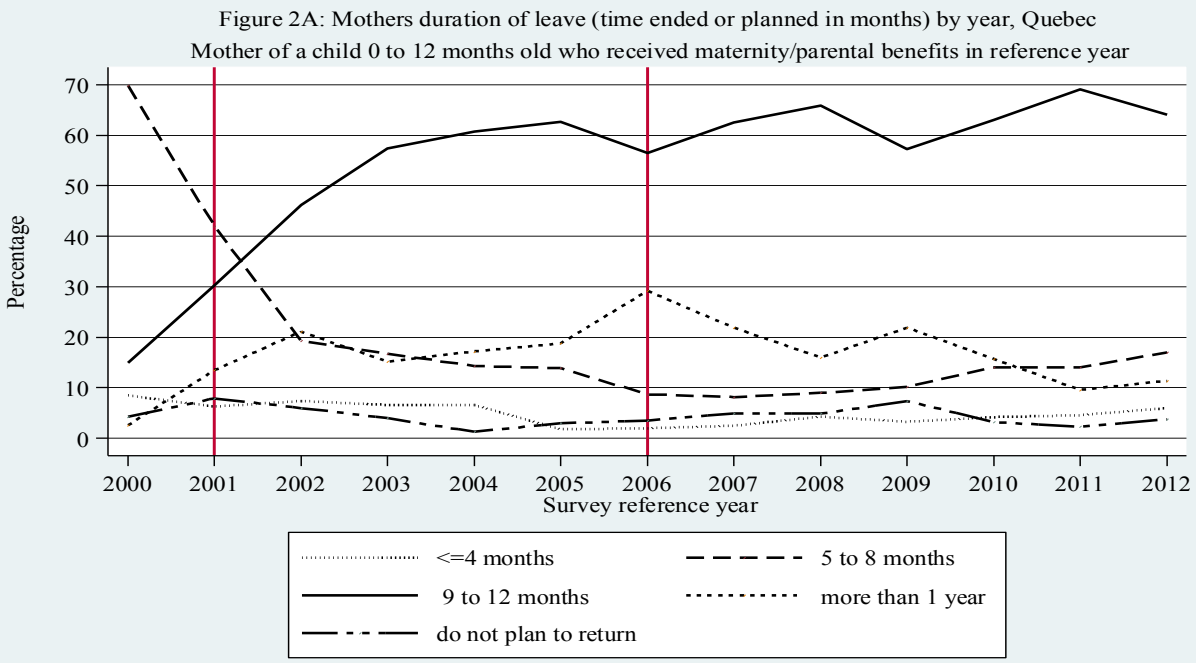
Authors' calculation from Employment Insurance Coverage Survey weighted micro-data.
Reference lines indicate policy changes

Figure 1B: Mothers with a child aged 0 to 12 months by year, Rest of Canada



Authors calculation from Employment Insurance Coverage Survey weighted micro-data
Reference lines indicate policy changes

Figure 2: Duration of Leave by Mothers with a Child 0-12 Months who received Maternity or Parental Benefits, Québec and Rest of Canada by year, 2000 to 2012



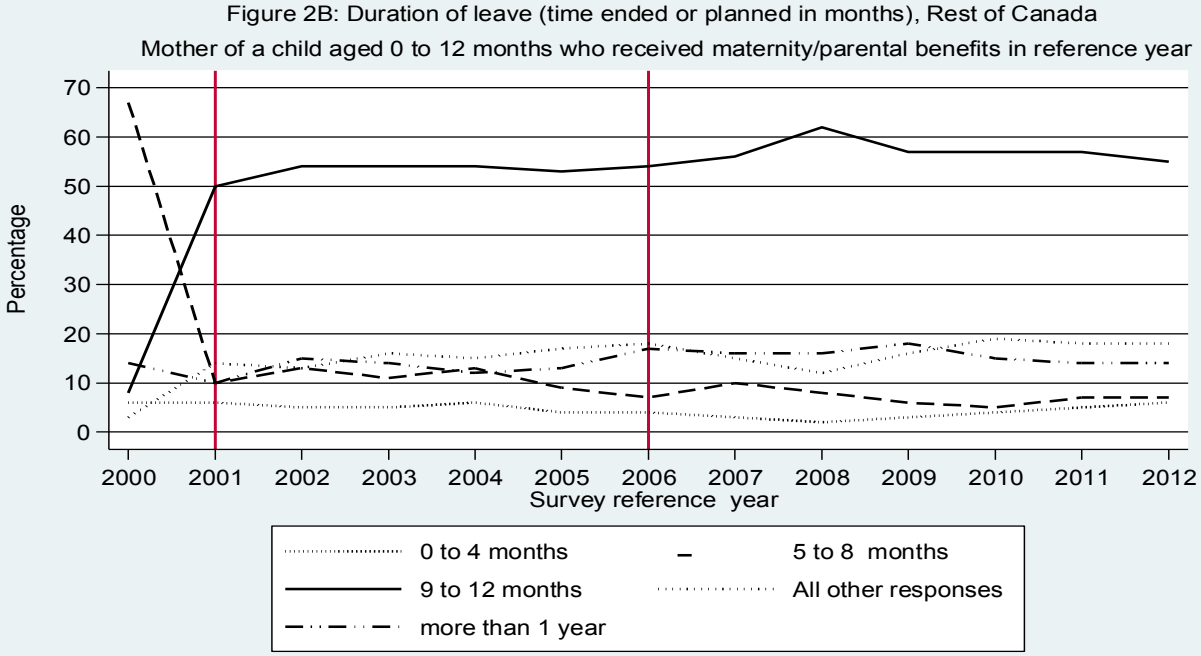
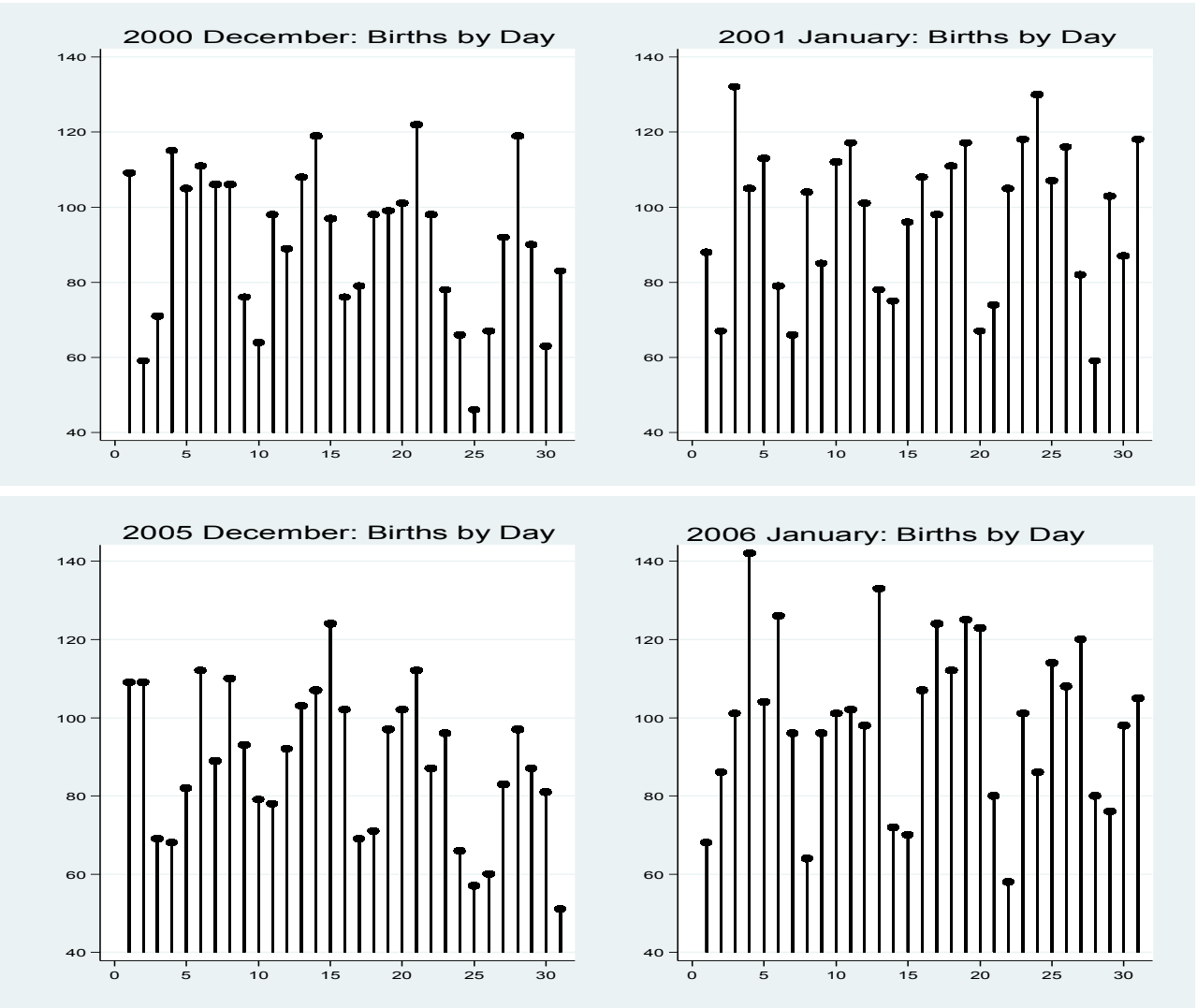
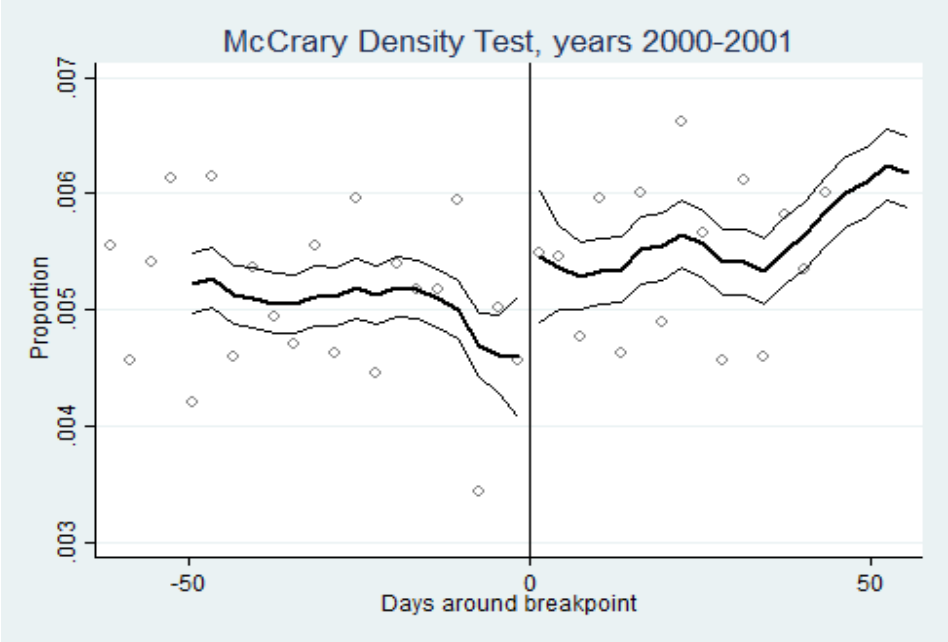


Figure 3: Births by Day and Month, samples 2000-2001, and 2005-2006



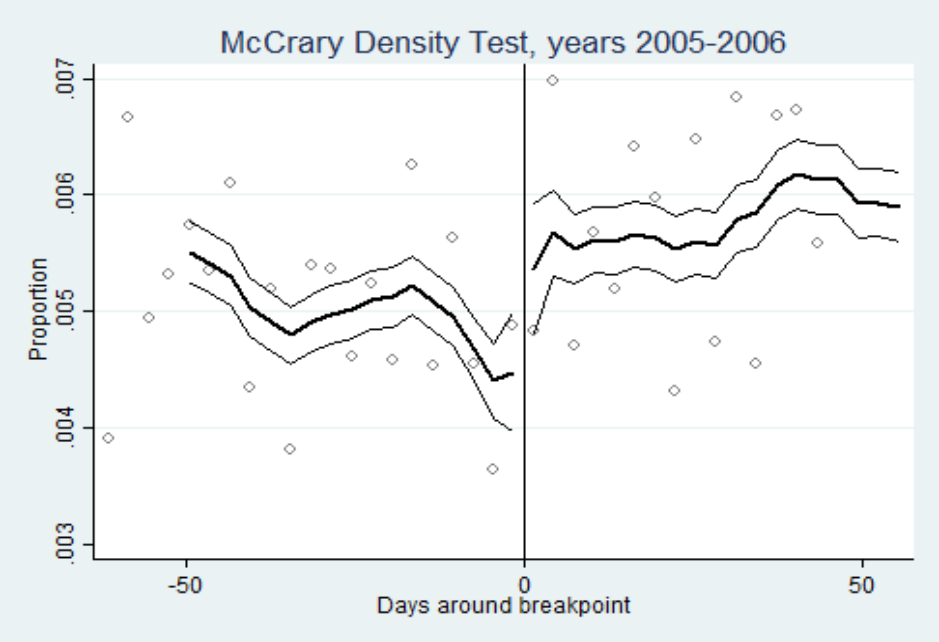
Source: Authors' calculation from RAMQ data sets.

Figure 4.1: Running variable density test, 2000-2001



Note: McCrary DCdensity test results, 2000-2001. Bin size of 3, bandwidth of 11. Standard errors presented on either side. Two months presented on each side of breakpoint.

Figure 4.2: Running variable density test, 2005-2006



Note: McCrary DCdensity test results, 2000-2001. Bin size of 3, bandwidth of 11. Standard errors presented on either side. Two months presented on each side of breakpoint, excluding 31 December.

Appendix

In this Appendix we present from Birth registries additional Tables on number of childbirths by month and year, and characteristics of mothers and newborns by selected year and month. Additional Figures are also presented to further support the robustness of our paper's empirical discontinuity design. Figures marked A are for periods 1-3, while those marked B are for periods 4-6.

Table A1: Number of childbirths by month and year in Québec, 2000-2001 and 2005-2006

Year	2000		2001		2005		2006	
Month	Freq.	%	Freq.	%	Freq.	%	Freq.	%
1	5,928	8.23	5,764	7.82	5,829	7.64	6,463	7.89
2	5,882	8.17	5,65	7.67	5,546	7.26	6,182	7.54
3	6,407	8.90	6,576	8.92	6,566	8.60	6,838	8.34
4	6,449	8.96	6,534	8.87	6,569	8.60	6,668	8.14
5	6,623	9.20	6,641	9.01	6,744	8.83	6,992	8.53
6	6,305	8.76	6,243	8.47	6,661	8.73	6,915	8.44
7	6,157	8.55	6,254	8.49	6,763	8.86	7,097	8.66
8	6,043	8.39	6,425	8.72	6,792	8.90	7,267	8.87
9	5,900	8.19	6,176	8.38	6,780	8.88	7,365	8.99
10	5,632	7.82	6,136	8.33	6,345	8.31	7,095	8.66
11	5,364	7.45	5,664	7.69	6,124	8.02	6,654	8.12
12	5,320	7.39	5,636	7.65	5,622	7.36	6,426	7.84
Total	72,010	100.00	73,699	100.00	76,341	100.00	81,962	100.00

Source: Authors' computations from annual Births Registries.

Table A2: Characteristics of mothers and newborns by selected year and month

			Mother's Place of birth			
2000-2001	10	11	12	1	2	3
Québec	0.76	0.77	0.77	0.77	0.78	0.79
RofC	0.05	0.06	0.05	0.06	0.05	0.06
Other	0.19	0.16	0.17	0.16	0.16	0.14
2005-2006	10	11	12	1	2	3
Québec	0.75	0.75	0.73	0.74	0.73	0.74
RofC	0.06	0.06	0.06	0.06	0.05	0.05
Other	0.18	0.18	0.20	0.17	0.21	0.18
			Age group of the mother at child birth			
2000-2001	10	11	12	1	2	3
11-16	0.00	0.00	0.00	0.00	0.00	0.00
17-35	0.90	0.88	0.89	0.89	0.90	0.90
36 or more	10	11	12	1	2	3
2005-2006	10.00	11.00	12.00	1.00	2.00	3.00
11-16	0.00	0.00	0.00	0.00	0.00	0.00
17-35	0.88	0.89	0.88	0.89	0.89	0.89
36 or more	0.11	0.11	0.12	0.11	0.11	0.11
			Mean age of the mother at child birth			
2000-2001	10	11	12	1	2	3
Age	28.3	28.5	28.3	28.4	28.4	28.6
2005-2006	10	11	12	1	2	3
Age	29.0	29.0	28.8	29.1	29.1	29.1
			Mother's mother tongue			
2000-2001	10	11	12	1	2	3
French	0.79	0.80	0.80	0.80	0.81	0.81
English	0.12	0.11	0.11	0.11	0.11	0.11
Other	0.00	0.01	0.01	0.01	0.01	0.01
2005-2006	10	11	12	1	2	3
French	0.77	0.77	0.76	0.78	0.78	0.77
English	0.12	0.12	0.12	0.10	0.10	0.11
Other	0.01	0.01	0.01	0.01	0.01	0.01
			Family status of the mother			
2000-2001	10	11	12	1	2	3
Couple	0.88	0.86	0.87	0.87	0.85	0.86
Single parent	0.07	0.08	0.08	0.08	0.08	0.08
2005-2006	10	11	12	1	2	3
Couple	0.87	0.88	0.87	0.87	0.86	0.86
Single parent	0.07	0.06	0.07	0.08	0.08	0.08
			Mother's level of education			
2000-2001	10	11	12	1	2	3
No diploma	0.06	0.07	0.08	0.07	0.07	0.07
High school	0.25	0.25	0.25	0.24	0.22	0.22
College	0.29	0.29	0.28	0.30	0.31	0.29
University or more	0.25	0.26	0.25	0.27	0.28	0.31
2005-2006	10	11	12	1	2	3
No diploma	0.06	0.07	0.07	0.05	0.05	0.04
High school	0.19	0.19	0.22	0.21	0.20	0.20
College	0.29	0.27	0.28	0.26	0.24	0.25
University or more	0.33	0.33	0.29	0.31	0.31	0.29

Table A2 (continued)

Sex of child						
2000-2001	10.00	11.00	12.00	1.00	2.00	3.00
Boy	0.51	0.52	0.52	0.51	0.52	0.51
2005-2006	10	11	12	1	2	3
Boy	0.50	0.51	0.52	0.51	0.52	0.52
Birth weight of child						
2000-2001	10	11	12	1	2	3
Weight kg	3373	3377	3358	3352	3358	3362
Std	580	581	602	580	587	562
2005-2006	10	11	12	1	2	3
Weight kg	3360	3369	3336	3346	3351	3350
Std	556	567	574	568	555	565
Low birth weight						
2000-2001	10	11	12	1	2	3
<2,500 kg	0.04	0.05	0.05	0.05	0.05	0.05
=>2,500 kg	0.95	0.94	0.94	0.94	0.94	0.94
2005-2006	10	11	12	1	2	3
<2,500 kg	0.05	0.05	0.05	0.05	0.05	0.05
=>2,500 kg	0.94	0.95	0.94	0.94	0.94	0.94
Mean number of gestation weeks						
2000-2001	10	11	12	1	2	3
Weeks	38.8	38.8	38.8	38.8	38.8	38.8
2005-2006	10	11	12	1	2	3
Weeks	38.8	38.9	38.7	38.8	38.8	38.8
Number of gestation weeks						
2000-2001	10	11	12	1	2	3
Less than 29	0.01	0.01	0.01	0.01	0.01	0.00
30-35	0.04	0.04	0.04	0.04	0.04	0.04
37 or more	0.92	0.93	0.91	0.91	0.92	0.92
2005-2006	10	11	12	1	2	3
Less than 29	0.00	0.01	0.01	0.00	0.00	0.00
30-35	0.04	0.03	0.04	0.04	0.03	0.03
37 or more	0.93	0.93	0.92	0.92	0.93	0.93
Birth order of the child and single birth						
2000-2001	10	11	12	1	2	3
1	0.47	0.48	0.48	0.47	0.45	0.46
2	0.35	0.34	0.34	0.36	0.38	0.37
3 or more	0.14	0.15	0.15	0.14	0.142	0.14
Single birth	0.98	0.97	0.97	0.97	0.97	0.97
2005-2006	10	11	12	1	2	3
1	0.48	0.47	0.48	0.46	0.46	0.46
2	0.35	0.35	0.34	0.36	0.36	0.37
3 or more	0.13	0.15	0.14	0.14	0.14	0.14
Single birth	0.97	0.98	0.97	0.97	0.97	0.97

Source: Authors' computations from annual Birth Registries.
Note: Months 10, 11, 12, 1, 2, and 3 represent October to March. The total of percentage age may not sum to 100% because missing observations are excluded. RofC: other Canadian provinces.

Table A3.1: Non-parametric local estimations for costs, acts and visits, 2000-2001, 99th percentile removed

Period in days	Specification	Cost $	Acts	Cost-MH $	Acts-MH	Visits	Visits-MH
Optimal Data-driven Bandwidth Selection							
-271 to -1	Conventional	5.41	-0.65	0.82	0.05**	-0.57	0.02
		(16.62)	(0.63)	(0.69)	(0.02)	(0.45)	(0.02)
0 to 182	Conventional	26.07	-0.26	0.36	-0.01	-0.14	0
		(24)	(0.29)	(0.9)	(0.03)	(0.19)	(0.02)
183 to 365	Conventional	-2.64	-0.04	-2.45**	-0.07**	-0.02	-0.06***
		(8.11)	(0.28)	(1.05)	(0.03)	(0.2)	(0.02)
366 to 731	Conventional	-21.48	-0.18	-1.58	-0.1	-0.13	-0.05
		(22.65)	(0.47)	(2.05)	(0.07)	(0.42)	(0.05)
732 to 1,825	Conventional	10.53	-0.04	-5.22	-0.27	0.06	-0.21
		(49.83)	(1.18)	(6.45)	(0.22)	(0.87)	(0.15)
0 to 1,825	Conventional	20.33	-0.12	-11.32	-0.33	0.03	-0.43*
		(74.64)	(1.79)	(8.78)	(0.31)	(1.34)	(0.22)
-271 to -1	BC robust	0.73	-0.87	0.95	0.05*	-0.74	0.02
		(19.53)	(0.73)	(0.8)	(0.03)	(0.5)	(0.02)
0 to 182	BC robust	30.13	-0.36	0.45	0	-0.21	0.01
		(28.83)	(0.34)	(1.06)	(0.04)	(0.23)	(0.03)
183 to 365	BC robust	-1.36	0.01	-2.8**	-0.07*	-0.01	-0.06**
		(9.66)	(0.33)	(1.22)	(0.04)	(0.24)	(0.03)
366 to 731	BC robust	-27.18	-0.17	-2.03	-0.12	-0.26	-0.06
		(26.73)	(0.57)	(2.4)	(0.08)	(0.49)	(0.06)
732 to 1,825	BC robust	10.35	0.08	-6.74	-0.34	-0.02	-0.25
		(59.86)	(1.42)	(7.6)	(0.25)	(1.04)	(0.18)
0 to 1,825	BC robust	16.23	-0.31	-13.19	-0.39	-0.22	-0.49*
		(89.85)	(2.14)	(10.42)	(0.37)	(1.59)	(0.26)
With Double Bandwidth							
-271 to -1	Conventional	15.98	0	0.57	0.02	0.03	0
		(11.5)	(0.44)	(0.52)	(0.02)	(0.31)	(0.01)
0 to 182	Conventional	13.85	-0.04	0.19	-0.02	0.02	-0.01
		(16.7)	(0.2)	(0.64)	(0.02)	(0.13)	(0.02)
183 to 365	Conventional	-7.01	-0.18	-1.6**	-0.06***	-0.07	-0.04**
		(5.63)	(0.19)	(0.74)	(0.02)	(0.14)	(0.02)
366 to 731	Conventional	-17.69	-0.22	-0.47	-0.06	0.06	-0.02
		(16.02)	(0.33)	(1.54)	(0.05)	(0.29)	(0.04)
732 to 1,825	Conventional	7.56	-0.48	-2.42	-0.15	-0.07	-0.09
		(34.87)	(0.84)	(4.65)	(0.15)	(0.62)	(0.11)
0 to 1,825	Conventional	18.96	-0.1	-8.97	-0.26	0.23	-0.29*
		(52.32)	(1.26)	(6.11)	(0.22)	(0.94)	(0.16)
-271 to -1	BC robust	6.18	-0.75	0.99	0.04**	-0.58	0.02
		(17.13)	(0.65)	(0.73)	(0.02)	(0.46)	(0.02)
0 to 182	BC robust	27.25	-0.26	0.14	-0.02	-0.05	0
		(24.87)	(0.3)	(0.93)	(0.04)	(0.2)	(0.03)
183 to 365	BC robust	-3.38	-0.15	-2.28**	-0.08***	-0.06	-0.07***
		(8.44)	(0.29)	(1.09)	(0.03)	(0.2)	(0.02)
366 to 731	BC robust	-15.43	-0.08	-2.11	-0.07	0.09	-0.03
		(23.52)	(0.49)	(2.15)	(0.07)	(0.43)	(0.05)
732 to 1,825	BC robust	14.69	0.25	-4.8	-0.29	0.32	-0.2
		(51.58)	(1.24)	(6.73)	(0.22)	(0.91)	(0.16)
0 to 1,825	BC robust	16.51	0.2	-9.54	-0.31	0.43	-0.44*
		(77.44)	(1.85)	(9.12)	(0.32)	(1.39)	(0.23)

Notes: Costs are the sum of medical fees; MH indicates mental health. See text for specification. Statistical significance: *=10%. **=5%; ***=1%.

Table A3.2: Non-parametric local estimations for costs, acts and visits, 2005-2006, 99th percentile removed

Period in days	Specification	Cost $	Acts	Cost-MH $	Acts-MH	Visits	Visits-MH
Optimal Data-driven Bandwidth Selection							
-271 to -1	Conventional	41.56**	0.61	0.92	0.04	0.74*	0.04**
		(17.62)	(0.67)	(0.83)	(0.03)	(0.45)	(0.02)
0 to 182	Conventional	46.16*	0.35	0.86	0.03	0.23	0.01
		(23.92)	(0.25)	(0.75)	(0.03)	(0.2)	(0.02)
183 to 365	Conventional	-0.16	-0.2	-0.09	0.02	-0.06	0.02
		(6.55)	(0.25)	(0.9)	(0.03)	(0.17)	(0.02)
366 to 731	Conventional	-6.61	-0.83	-1.16	0.03	-0.47	0.02
		(22.86)	(0.66)	(2.05)	(0.06)	(0.44)	(0.04)
732 to 1,825	Conventional	86.98	0.82	4.89	0.09	1.35	0.09
		(56.92)	(1.3)	(5.95)	(0.22)	(0.98)	(0.13)
0 to 1,825	Conventional	117.66	1.58	1.07	0.25	1.67	0.22
		(80.56)	(1.96)	(7.57)	(0.29)	(1.43)	(0.17)
-271 to -1	BC robust	45.33**	0.57	0.9	0.05	0.77	0.04**
		(20.97)	(0.81)	(0.98)	(0.04)	(0.54)	(0.02)
0 to 182	BC robust	55.59**	0.38	0.95	0.03	0.24	0.01
		(27.13)	(0.3)	(0.89)	(0.03)	(0.24)	(0.02)
183 to 365	BC robust	0.8	-0.26	-0.26	0.02	-0.08	0.02
		(7.67)	(0.3)	(1.08)	(0.04)	(0.2)	(0.03)
366 to 731	BC robust	-7	-0.94	-1.59	0.03	-0.58	0.02
		(27.29)	(0.78)	(2.45)	(0.07)	(0.52)	(0.04)
732 to 1,825	BC robust	100.75	1.07	4.93	0.09	1.51	0.11
		(66.95)	(1.54)	(7.09)	(0.26)	(1.17)	(0.15)
0 to 1,825	BC robust	142.38	1.73	-0.21	0.28	1.69	0.24
		(94.43)	(2.34)	(8.99)	(0.35)	(1.72)	(0.21)
With Double Bandwidth							
-271 to -1	Conventional	32.25***	0.67	0.79	0.03	0.67**	0.03***
		(12.34)	(0.48)	(0.63)	(0.02)	(0.32)	(0.01)
0 to 182	Conventional	18.54	0.19	0.54	0.02	0.15	0
		(16.53)	(0.18)	(0.53)	(0.02)	(0.14)	(0.01)
183 to 365	Conventional	-2.12	-0.11	0.11	0.03	-0.05	0.02
		(4.93)	(0.18)	(0.6)	(0.02)	(0.12)	(0.02)
366 to 731	Conventional	-15.14	-0.55	-0.23	0.02	-0.25	0.02
		(16.15)	(0.47)	(1.37)	(0.04)	(0.31)	(0.03)
732 to 1,825	Conventional	34.83	0.11	3.24	0.07	0.66	0.02
		(40.05)	(0.89)	(4.19)	(0.15)	(0.68)	(0.09)
0 to 1,825	Conventional	44.9	0.59	4	0.17	1.11	0.18
		(56.15)	(1.34)	(5.38)	(0.2)	(0.99)	(0.12)
-271 to -1	BC robust	41.37**	0.68	0.73	0.04	0.81*	0.04**
		(18.41)	(0.71)	(0.87)	(0.03)	(0.47)	(0.02)
0 to 182	BC robust	47.5*	0.39	0.89	0.03	0.27	0.01
		(24.9)	(0.26)	(0.78)	(0.03)	(0.2)	(0.02)
183 to 365	BC robust	0.46	-0.11	-0.25	0.02	-0.02	0.02
		(6.92)	(0.26)	(0.93)	(0.03)	(0.18)	(0.02)
366 to 731	BC robust	-1.93	-0.68	-1.18	0.03	-0.35	0.01
		(23.69)	(0.68)	(2.11)	(0.06)	(0.46)	(0.04)
732 to 1,825	BC robust	77.13	0.58	6.39	0.1	1.19	0.08
		(59.04)	(1.34)	(6.17)	(0.23)	(1.02)	(0.13)
0 to 1,825	BC robust	124.39	1.76	0.91	0.23	1.77	0.23
		(83.85)	(2.02)	(7.82)	(0.3)	(1.48)	(0.18)

Notes: Costs are the sum of medical fees; MH indicates mental health. See text for specification. Statistical significance: *=10%. **=5%; ***=1%.

Table A3.3: Non-parametric local estimations for hospitalization, 2000-2001, 99th percentile removed

Period in days	Specification	Cost $	Acts	Cost-MH $	Acts-MH	Hospitalization
Optimal Data-driven Bandwidth Selection						
-271 to -1	Conventional	2.22	-0.07	-0.24	0	-0.05
		(7.88)	(0.21)	(0.28)	(0.01)	(0.07)
0 to 182	Conventional	18.54	-0.13	-4.89	-0.19	0
		(21.72)	(0.13)	(3.46)	(0.14)	(0.02)
183 to 365	Conventional	1.2	-0.01	-0.13**	0	0.01
		(2.09)	(0.04)	(0.06)	(0)	(0.01)
366 to 731	Conventional	-19	-0.21**	-0.51	-0.02	-0.07**
		(14.41)	(0.1)	(0.53)	(0.02)	(0.03)
732 to 1,825	Conventional	-9.65	-0.09	-2.29**	-0.06	-0.04
		(27.53)	(0.2)	(1.01)	(0.04)	(0.06)
0 to 1,825	Conventional	-11.82	-0.19	-3.34	-0.12	-0.1
		(42.35)	(0.4)	(3.49)	(0.14)	(0.08)
-271 to -1	BC robust	1.03	-0.13	-0.24	0	-0.07
		(9.52)	(0.25)	(0.31)	(0.01)	(0.08)
0 to 182	BC robust	19.03	-0.17	-5.81	-0.23	0
		(26.23)	(0.15)	(4.14)	(0.17)	(0.02)
183 to 365	BC robust	1.67	0	-0.14*	0	0.02
		(2.49)	(0.04)	(0.08)	(0)	(0.02)
366 to 731	BC robust	-22.99	-0.21*	-0.68	-0.03	-0.08**
		(16.85)	(0.11)	(0.58)	(0.02)	(0.04)
732 to 1825	BC robust	-12.78	-0.09	-2.68**	-0.07*	-0.05
		(32.84)	(0.24)	(1.15)	(0.04)	(0.08)
0 to 1825	BC robust	-18.29	-0.22	-4.16	-0.15	-0.1
		(50.64)	(0.48)	(4.05)	(0.16)	(0.1)
With Double Bandwidth						
-271 to -1	Conventional	3.7	0.05	-0.26	-0.01	0
		(5.28)	(0.15)	(0.26)	(0.01)	(0.05)
0 to 182	Conventional	14.83	0	-2.95	-0.11	-0.01
		(15.13)	(0.09)	(2.12)	(0.09)	(0.01)
183 to 365	Conventional	-0.04	-0.02	-0.1	0	0
		(1.4)	(0.03)	(0.13)	(0)	(0.01)
366 to 731	Conventional	-14.69	-0.19***	0.08	0	-0.07***
		(10.38)	(0.07)	(0.44)	(0.02)	(0.02)
732 to 1,825	Conventional	-6.35	-0.11	0.99	0.02	-0.03
		(19.12)	(0.14)	(1.35)	(0.04)	(0.05)
0 to 1,825	Conventional	-6.61	-0.21	-1.37	-0.05	-0.09
		(29.42)	(0.27)	(2.35)	(0.09)	(0.06)
-271 to -1	BC robust	2.85	-0.09	-0.19	-0.01	-0.07
		(8.1)	(0.22)	(0.3)	(0.01)	(0.07)
0 to 182	BC robust	26.32	-0.11	-4.57	-0.18	0.01
		(22.45)	(0.13)	(3.53)	(0.14)	(0.02)
183 to 365	BC robust	1.93	0	-0.09	-0.01	0.01
		(2.19)	(0.04)	(0.1)	(0)	(0.02)
366 to 731	BC robust	-19.67	-0.19*	-0.6	-0.03	-0.07*
		(14.93)	(0.1)	(0.57)	(0.02)	(0.04)
732 to 1,825	BC robust	-6.29	-0.15	-2**	-0.04	-0.04
		(28.47)	(0.21)	(0.93)	(0.03)	(0.07)
0 to 1,825	BC robust	-8.27	-0.2	-2.95	-0.11	-0.1
		(43.66)	(0.41)	(3.58)	(0.14)	(0.09)

Notes: Costs are the sum of medical fees; MH indicates mental health. See text for specification. Statistical significance: *=10%. **=5%; ***=1%.

Table A3.4: Non-parametric local estimations for hospitalization, 2005-2006, 99th percentile removed

Period in days	Specification	Cost $	Acts	Cost-MH $	Acts-MH	Hospitalization
Optimal Data-driven Bandwidth Selection						
-271 to -1	Conventional	8.53	0.29	0.07	0	0.09
		(6.7)	(0.2)	(0.13)	(0.01)	(0.06)
0 to 182	Conventional	54.66**	0.07	0.41	0.01	0.02
		(24.09)	(0.14)	(0.48)	(0.03)	(0.02)
183 to 365	Conventional	1.1	0.02	-0.06	0	-0.01
		(1.34)	(0.03)	(0.29)	(0.01)	(0.02)
366 to 731	Conventional	-4.57	0.05	-0.08	-0.01	0.06
		(12.72)	(0.13)	(0.05)	(0)	(0.05)
732 to 1,825	Conventional	37.2	0.45*	2.57	0.06	0.11
		(30.43)	(0.26)	(1.59)	(0.04)	(0.07)
0 to 1,825	Conventional	104.88**	0.87**	2.82	0.07	0.23**
		(47.57)	(0.41)	(1.74)	(0.05)	(0.11)
-271 to -1	BC robust	10.34	0.33	0.1	0	0.1
		(7.89)	(0.24)	(0.13)	(0.01)	(0.07)
0 to 182	BC robust	65.07**	0.04	0.29	0	0.02
		(27.6)	(0.17)	(0.52)	(0.03)	(0.02)
183 to 365	BC robust	0.81	0.02	-0.05	0	-0.01
		(1.52)	(0.03)	(0.31)	(0.01)	(0.02)
366 to 731	BC robust	-1	0.07	-0.14**	-0.01	0.08
		(14.68)	(0.15)	(0.06)	(0)	(0.05)
732 to 1,825	BC robust	43.81	0.54*	3.06*	0.06	0.13
		(35.88)	(0.3)	(1.74)	(0.05)	(0.08)
0 to 1,825	BC robust	123.85**	0.97**	3.14	0.05	0.25*
		(55.07)	(0.49)	(1.92)	(0.06)	(0.14)
With Double Bandwidth						
-271 to -1	Conventional	3.48	0.19	0.2*	0	0.05
		(4.53)	(0.15)	(0.12)	(0)	(0.04)
0 to 182	Conventional	28.28*	0.12	1.15	0.05*	0.01
		(17)	(0.1)	(0.76)	(0.03)	(0.01)
183 to 365	Conventional	1.68	0.01	0.06	-0.01	0
		(1.17)	(0.02)	(0.31)	(0.01)	(0.01)
366 to 731	Conventional	-15.14*	-0.02	-0.11	-0.01	0.03
		(9.02)	(0.09)	(0.14)	(0.01)	(0.03)
732 to 1,825	Conventional	12.73	0.2	1	0.05*	0.04
		(21.45)	(0.19)	(1.33)	(0.03)	(0.05)
0 to 1,825	Conventional	53.96	0.59**	3.38*	0.15**	0.15*
		(33.66)	(0.29)	(1.88)	(0.06)	(0.08)
-271 to -1	BC robust	9.14	0.35*	0.11	0.01	0.11*
		(6.89)	(0.21)	(0.15)	(0.01)	(0.06)
0 to 182	BC robust	61.09**	0.13	0.42	0.01	0.02
		(25.26)	(0.15)	(0.62)	(0.03)	(0.02)
183 to 365	BC robust	1.53	0.03	0.1	0	0
		(1.42)	(0.03)	(0.36)	(0.01)	(0.02)
366 to 731	BC robust	-5.27	0.1	-0.16	-0.01	0.08
		(13.17)	(0.13)	(0.14)	(0.01)	(0.05)
732 to 1,825	BC robust	38.81	0.43	3.32*	0.1**	0.11
		(31.59)	(0.27)	(1.85)	(0.05)	(0.08)
0 to 1,825	BC robust	116.34**	1.02**	4.31*	0.09	0.27**
		(49.95)	(0.43)	(2.24)	(0.06)	(0.12)

Notes: Costs are the sum of medical fees; MH indicates mental health. See text for specification. Statistical significance: *=10%. **=5%; ***=1%.

Table A3.5: Non-parametric local estimations for net costs of prescription drugs and associated physician fees, 2000-2001, 99th percentile removed

Period in days	Specification	Net Cost Drugs	Net Cost Drugs-MH	Total cost	N drugs	N drugs-MH
Optimal Data-driven Bandwidth Selection						
-271 to -1	Conventional	13.33	-0.28	49.9	0.34	-0.04
		(8.31)	(0.48)	(35.93)	(0.42)	(0.05)
0 to 182	Conventional	5.37	-0.22	-10.53	0.16	0.11
		(6.49)	(1.33)	(47.18)	(0.41)	(0.09)
183 to 365	Conventional	7.14	-3.82	5.51	0.27	-0.03
		(8.48)	(2.94)	(23.76)	(0.48)	(0.13)
366 to 731	Conventional	16.6	-9.97*	-18.58	0.36	-0.25
		(13.71)	(5.95)	(50.04)	(0.84)	(0.31)
732 to 1,825	Conventional	-39.54	-37.5**	-129.16	1.26	-1.56*
		(51.13)	(18.25)	(135.52)	(2.44)	(0.85)
0 to 1,825	Conventional	-41.07	-70**	-77.72	0.49	-2.72*
		(66.9)	(33.88)	(164.87)	(3.14)	(1.48)
-271 to -1	BC robust	14.61	-0.23	49.22	0.37	-0.04
		(9.6)	(0.56)	(43.22)	(0.5)	(0.06)
0 to 182	BC robust	5.73	-0.46	-18.72	0.18	0.11
		(7.89)	(1.5)	(55.8)	(0.5)	(0.11)
183 to 365	BC robust	9.61	-4.3	8.48	0.4	-0.04
		(9.83)	(3.55)	(27.98)	(0.56)	(0.15)
366 to 731	BC robust	19.98	-12.18*	-25.76	0.19	-0.34
		(16.55)	(6.76)	(60.4)	(1.01)	(0.35)
732 to 1,825	BC robust	-33.63	-43.28**	-153.19	2.01	-1.82*
		(62.12)	(21.22)	(160.48)	(2.83)	(1)
0 to 1,825	BC robust	-40.52	-75.7*	-112.36	0.84	-2.92
		(82.28)	(40.4)	(195.44)	(3.83)	(1.8)
With Double Bandwidth						
-271 to -1	Conventional	9.79	-0.32	33.07	0.3	-0.02
		(6.84)	(0.37)	(25.14)	(0.3)	(0.04)
0 to 182	Conventional	5.22	0.28	17.56	0.14	0.14**
		(4.48)	(1.01)	(32.52)	(0.28)	(0.07)
183 to 365	Conventional	1.97	-1.6	3.73	0.03	0.03
		(5.96)	(1.94)	(17.04)	(0.33)	(0.09)
366 to 731	Conventional	8.65	-4.14	-15.13	0.68	0.02
		(9.34)	(4.07)	(34.48)	(0.56)	(0.2)
732 to 1,825	Conventional	-49.35	-25.06*	-31.17	-0.73	-0.96*
		(35.01)	(12.92)	(94.26)	(1.66)	(0.57)
0 to 1,825	Conventional	-30.25	-48.71**	42.78	-0.2	-1.87**
		(44.35)	(22.48)	(112.86)	(2.13)	(0.95)
-271 to -1	BC robust	13.35	-0.45	57.04	0.26	-0.06
		(8.92)	(0.49)	(37.43)	(0.44)	(0.05)
0 to 182	BC robust	3.74	0.1	-3.25	0.14	0.11
		(6.92)	(1.4)	(49.19)	(0.43)	(0.1)
183 to 365	BC robust	7.15	-4.23	5.11	0.21	-0.05
		(8.95)	(3.04)	(24.8)	(0.5)	(0.13)
366 to 731	BC robust	18.49	-12.97**	-11.23	0.49	-0.31
		(14.24)	(6.28)	(52.31)	(0.86)	(0.32)
732 to 1,825	BC robust	-53.92	-46.52**	-129.94	0.74	-1.95**
		(53.72)	(19.28)	(141.83)	(2.54)	(0.89)
0 to 1,825	BC robust	-50.09	-80.23**	-62.47	0.01	-3.55**
		(68.66)	(35.16)	(170.84)	(3.24)	(1.53)

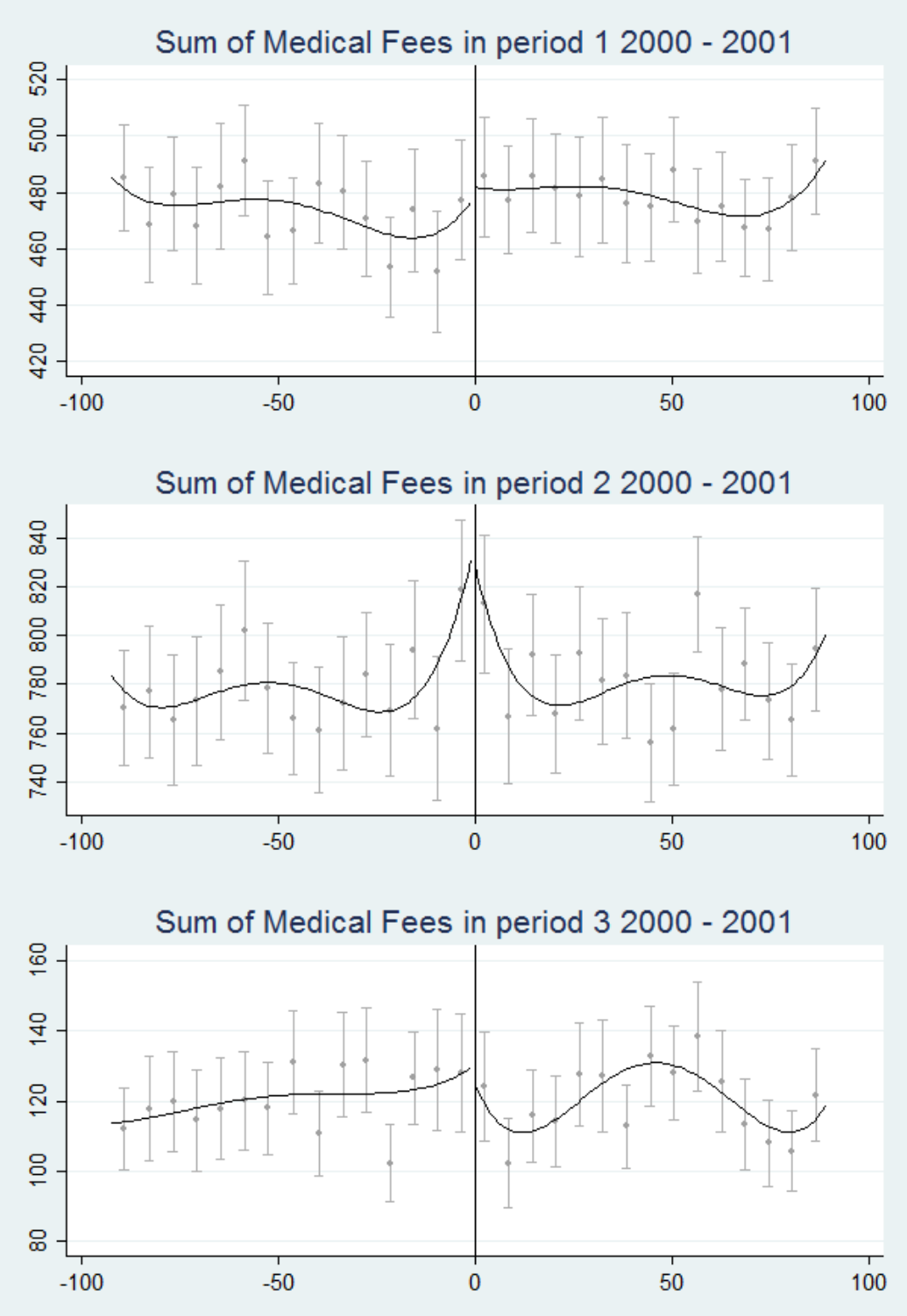
Notes: Net Cost Drugs are drug prices less patient contributions; MH indicates mental health; Total Cost are the sum of drug and physician fees. Statistical significance: *=10%. **=5%; ***=1%.

Table A3.6: Non-parametric local estimations for net costs of prescription drugs and associated physician fees, 2005-2006, 99th percentile removed

Period in days	Specification	Net Cost Drugs	Net Cost Drugs-MH	Total cost	N drugs	N drugs-MH
Optimal Data-driven Bandwidth Selection						
-271 to -1	Conventional	-17.73	-0.08	28.08	0	0.03
		(18.49)	(0.94)	(46.36)	(0.48)	(0.09)
0 to 182	Conventional	2.44	-0.24	-28.8	-0.1	0.05
		(11.2)	(1.34)	(49.01)	(0.38)	(0.12)
183 to 365	Conventional	16.67*	3.6	13.7	0.45	0.03
		(9.27)	(2.59)	(18.32)	(0.41)	(0.11)
366 to 731	Conventional	41.64**	16.93***	-16.68	2.17**	1.05***
		(18.48)	(6.09)	(57.46)	(0.94)	(0.33)
732 to 1,825	Conventional	123.19**	38.85**	219.6	6.94**	3.21***
		(53.16)	(17.9)	(165.37)	(2.73)	(1.06)
0 to 1,825	Conventional	207.36***	60.38**	174.11	8.57**	4.41***
		(74.76)	(25.21)	(198.24)	(3.76)	(1.5)
-271 to -1	BC robust	-23.11	-0.36	12.35	-0.04	0
		(21.69)	(1.07)	(54.12)	(0.57)	(0.1)
0 to 182	BC robust	3.81	-0.64	-32.99	-0.17	0.03
		(13.44)	(1.58)	(58.71)	(0.45)	(0.14)
183 to 365	BC robust	19.67*	4.21	15.55	0.51	0.04
		(10.84)	(3.04)	(21.45)	(0.5)	(0.13)
366 to 731	BC robust	47.64**	19.37***	-24.8	2.48**	1.2***
		(21.02)	(6.89)	(68.75)	(1.1)	(0.37)
732 to 1,825	BC robust	139.85**	44.31**	272.78	7.97**	3.7***
		(62.49)	(20.62)	(195.2)	(3.18)	(1.19)
0 to 1,825	BC robust	237.51***	69.45**	211.41	9.92**	5.05***
		(85.47)	(28.45)	(237.39)	(4.32)	(1.7)
With Double Bandwidth						
-271 to -1	Conventional	0.43	0.85	71.69**	0.18	0.1*
		(12.03)	(0.74)	(29.78)	(0.36)	(0.06)
0 to 182	Conventional	-0.22	0.6	-6.33	0.12	0.09
		(7.69)	(0.95)	(33.26)	(0.27)	(0.08)
183 to 365	Conventional	5.2	1.7	12.18	0.19	0.01
		(6.23)	(1.8)	(14.5)	(0.28)	(0.07)
366 to 731	Conventional	19.27	10.57**	-10.82	1.45**	0.6**
		(12.59)	(4.38)	(40.55)	(0.63)	(0.24)
732 to 1,825	Conventional	85.74**	28.06**	65.03	4.45**	1.6**
		(39.11)	(13.65)	(111.18)	(1.9)	(0.77)
0 to 1,825	Conventional	130.6**	31.56*	58.17	5.81**	2.55**
		(54.72)	(18.76)	(136.9)	(2.62)	(1.08)
-271 to -1	BC robust	-15.65	0.09	17.83	-0.05	0.03
		(19.6)	(1.01)	(47.7)	(0.51)	(0.09)
0 to 182	BC robust	2.09	0.39	-45.62	-0.11	0.04
		(11.68)	(1.43)	(50.53)	(0.4)	(0.12)
183 to 365	BC robust	14.09	3.09	18.64	0.47	0.04
		(9.59)	(2.68)	(19.48)	(0.43)	(0.11)
366 to 731	BC robust	38.72**	15.98**	-15.75	2.06**	1.02***
		(19.23)	(6.4)	(59.95)	(0.97)	(0.35)
732 to 1,825	BC robust	143.92**	43.46**	245.82	8.15***	3.31***
		(56.96)	(18.93)	(172.6)	(2.87)	(1.11)
0 to 1,825	BC robust	220.05***	58.15**	209.05	9.57**	4.57***
		(80.09)	(26.69)	(207.97)	(3.95)	(1.57)

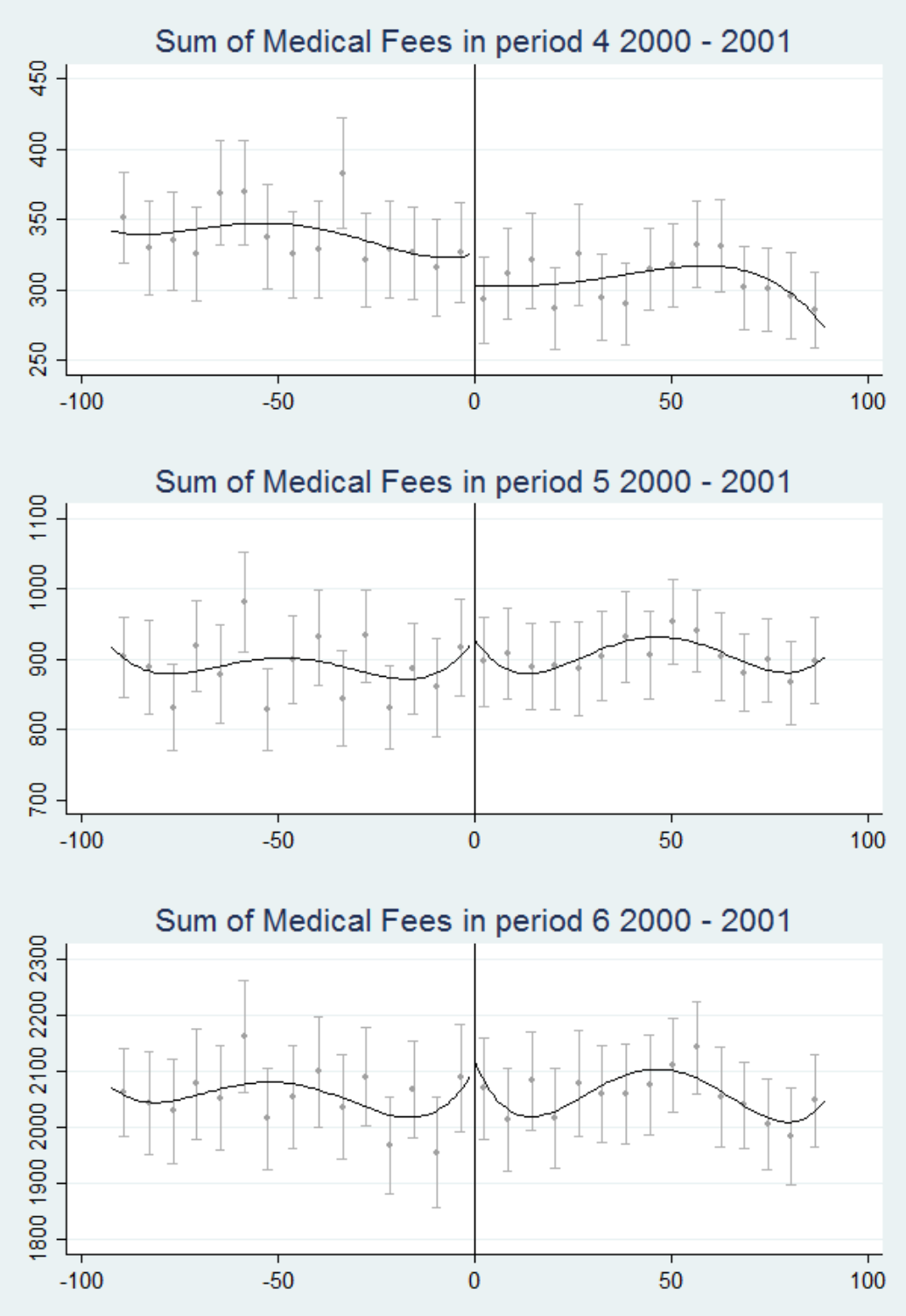
Notes: Costs are the sum of medical fees; MH indicates mental health. See text for specification. Statistical significance: *=10%. **=5%; ***=1%.

Figure 5.1A: Sum of medical fees in periods 1-3, 2000-2001



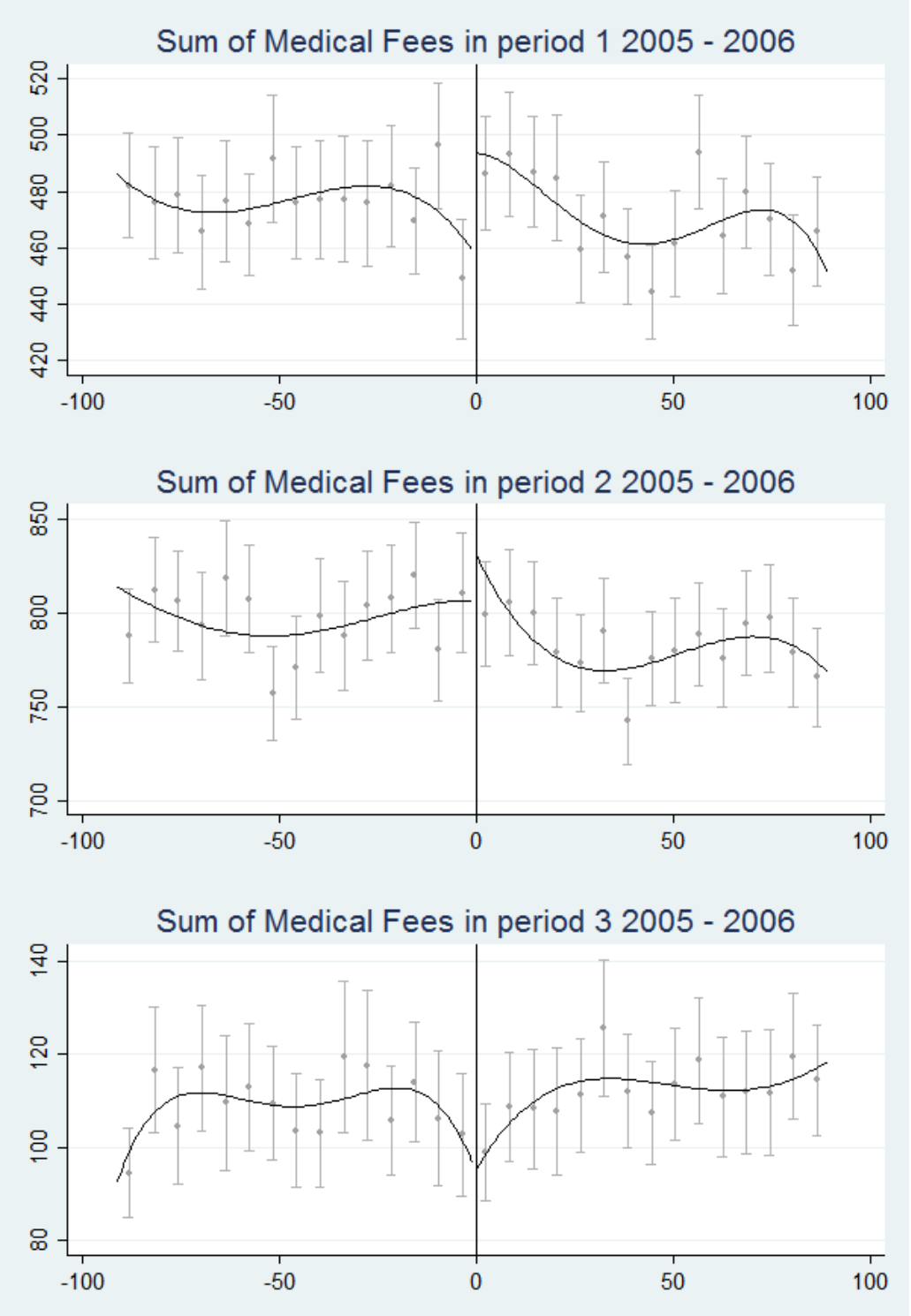
Note: Sum of Medical Fees represent total physician fees for the given period. Period 1 is days -271 to -1, period 2 days 0 to 182, period 3 days 183 to 365. Error bars represent 95% confidence interval.

Figure 5.1B: Sum of medical fees in periods 4-6, 2000-2001



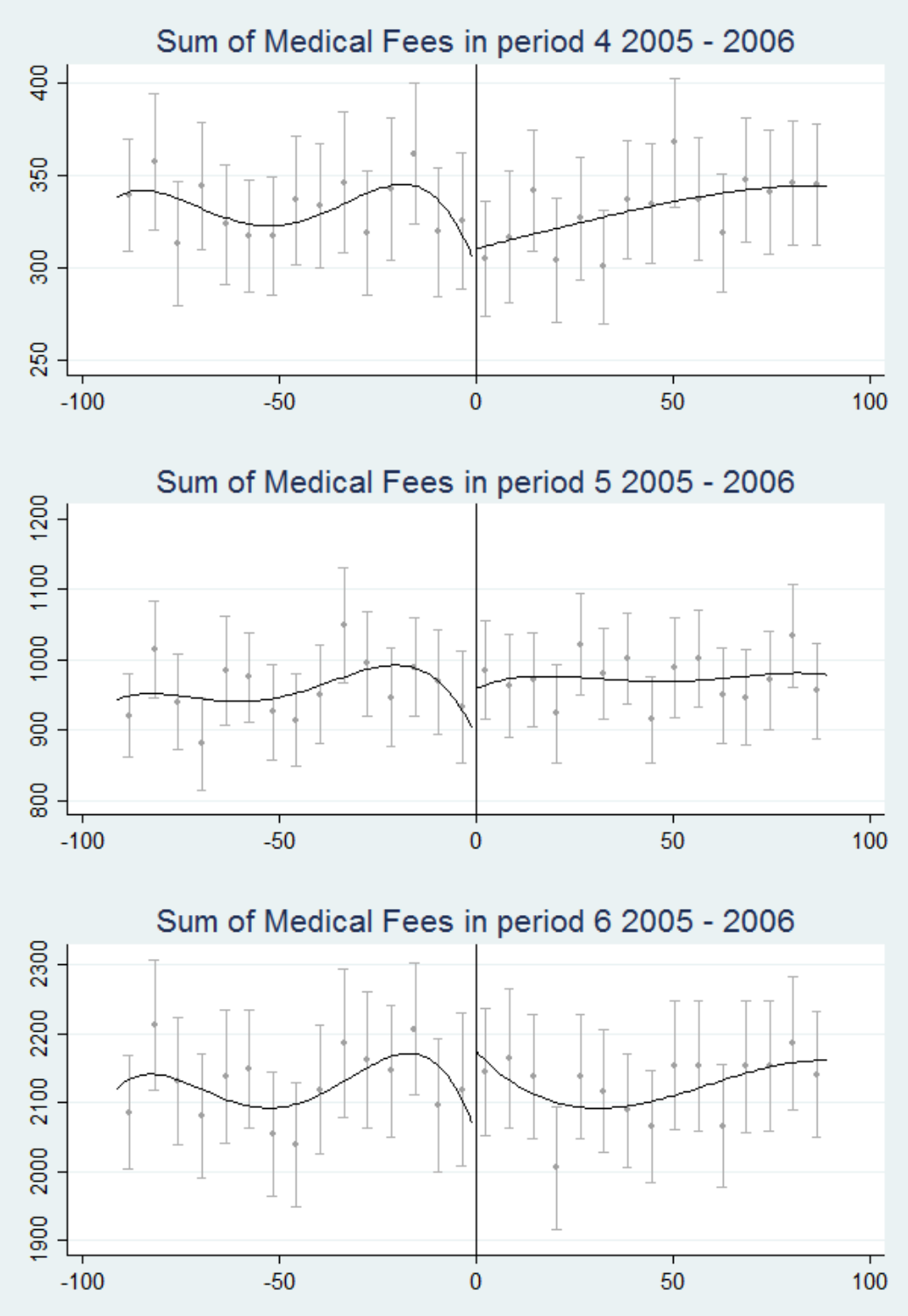
Note: Sum of Medical Fees represent total physician fees for the given period. Period 4 is days 366 to 731, period 5 days 732 to 1826, period 6 days 0 to 1826. Error bars represent 95% confidence interval.

Figure 5.2A: Sum of medical fees in periods 1-3, 2005-2006



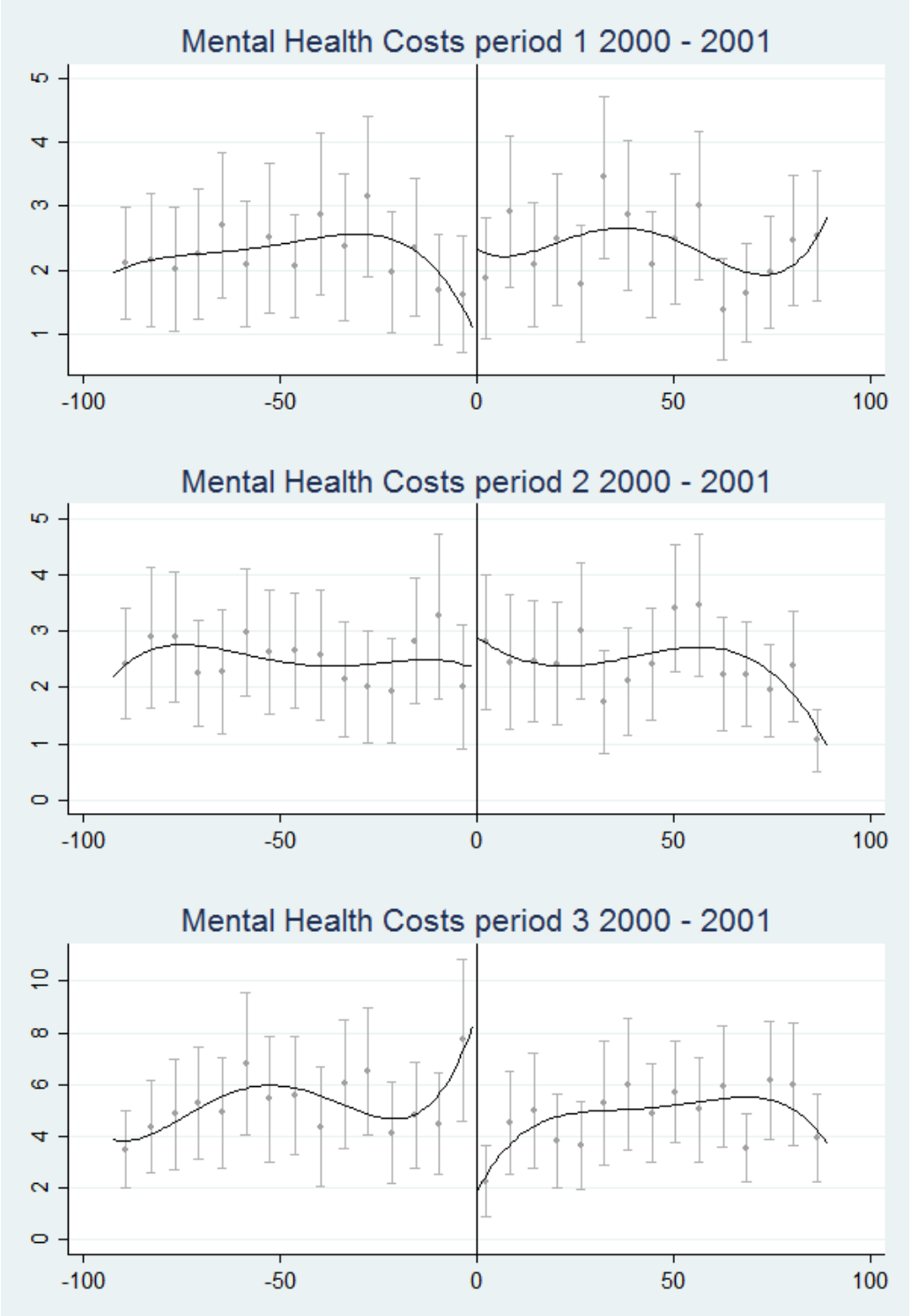
Note: Sum of Medical Fees represent total physician fees for the given period. Period 1 is days -271 to -1, period 2 days 0 to 182, period 3 days 183 to 365. Error bars represent 95% confidence interval.

Figure 5.2B: Sum of medical fees in periods 4-6, 2005-2006



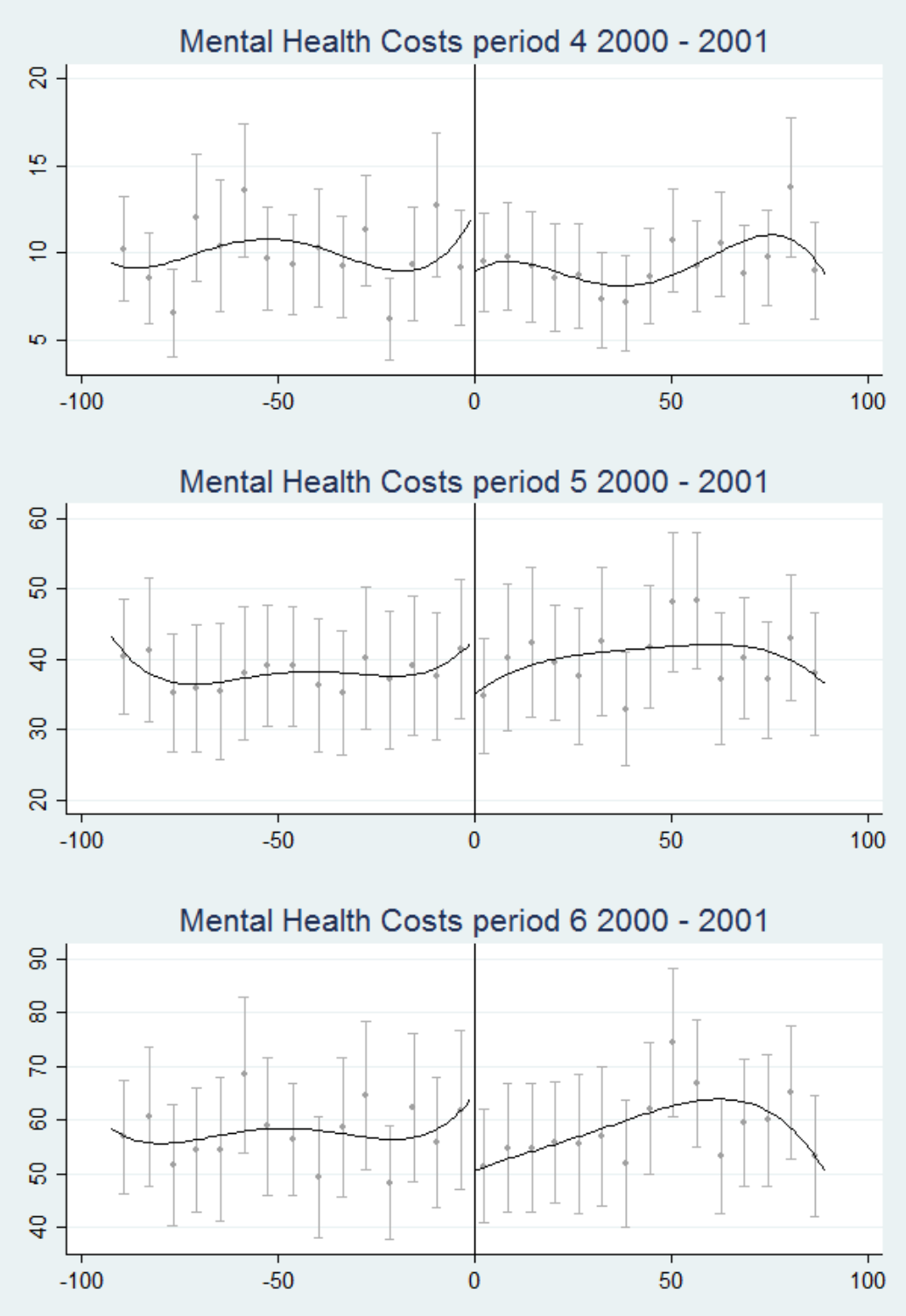
Note: Sum of Medical Fees represent total physician fees for the given period.
Period 4 is days 366 to 731, period 5 days 732 to 1826, period 6 days 0 to 1826.
Error bars represent 95% confidence interval.

Figure 5.3A: Mental health costs in periods 1-3, 2000-2001



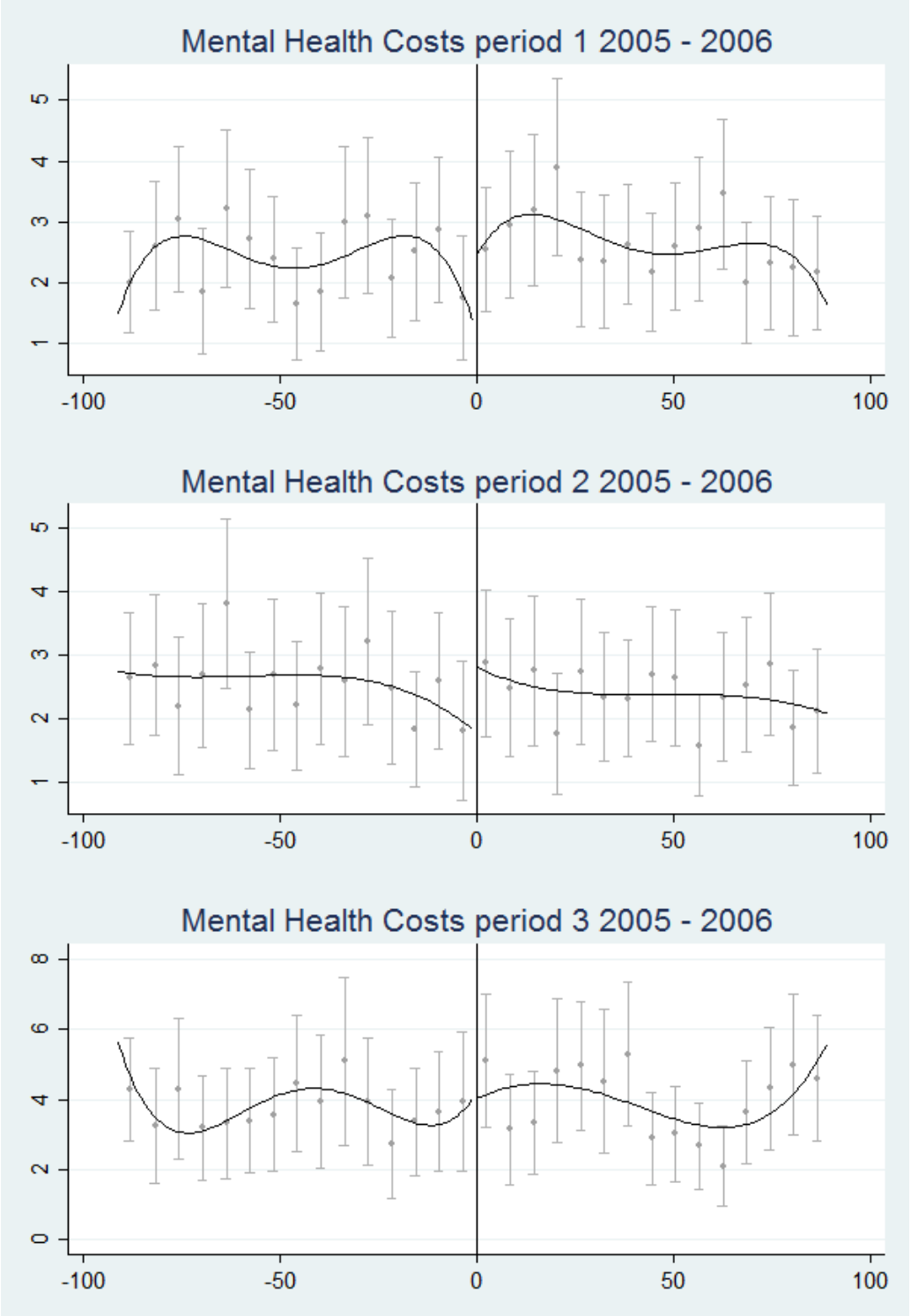
Note: Mental Health Costs represent total physician fees associated with psychological diagnostics for the given period. Period 1 is days -271 to -1, period 2 days 0 to 182, period 3 days 183 to 365. Error bars represent 95% confidence interval.

Figure 5.3B: Mental health costs in periods 4-6, 2000-2001



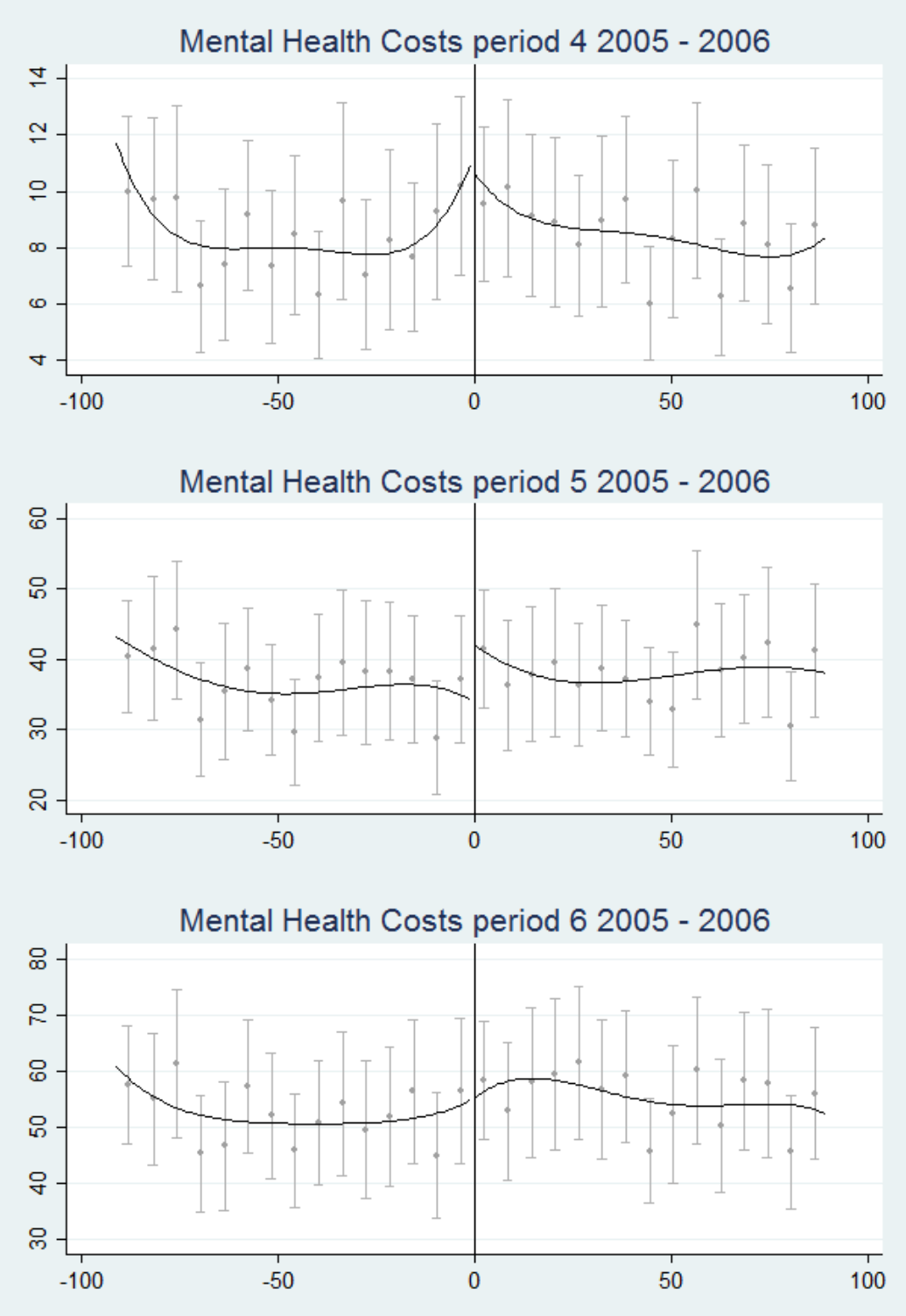
Note: Mental Health Costs represent total physician fees associated with psychological diagnostics for the given period. Period 4 is days 366 to 731, period 5 days 732 to 1826, period 6 days 0 to 1826. Error bars represent 95% confidence interval.

Figure 5.4A: Mental health costs in periods 1-3, 2005-2006



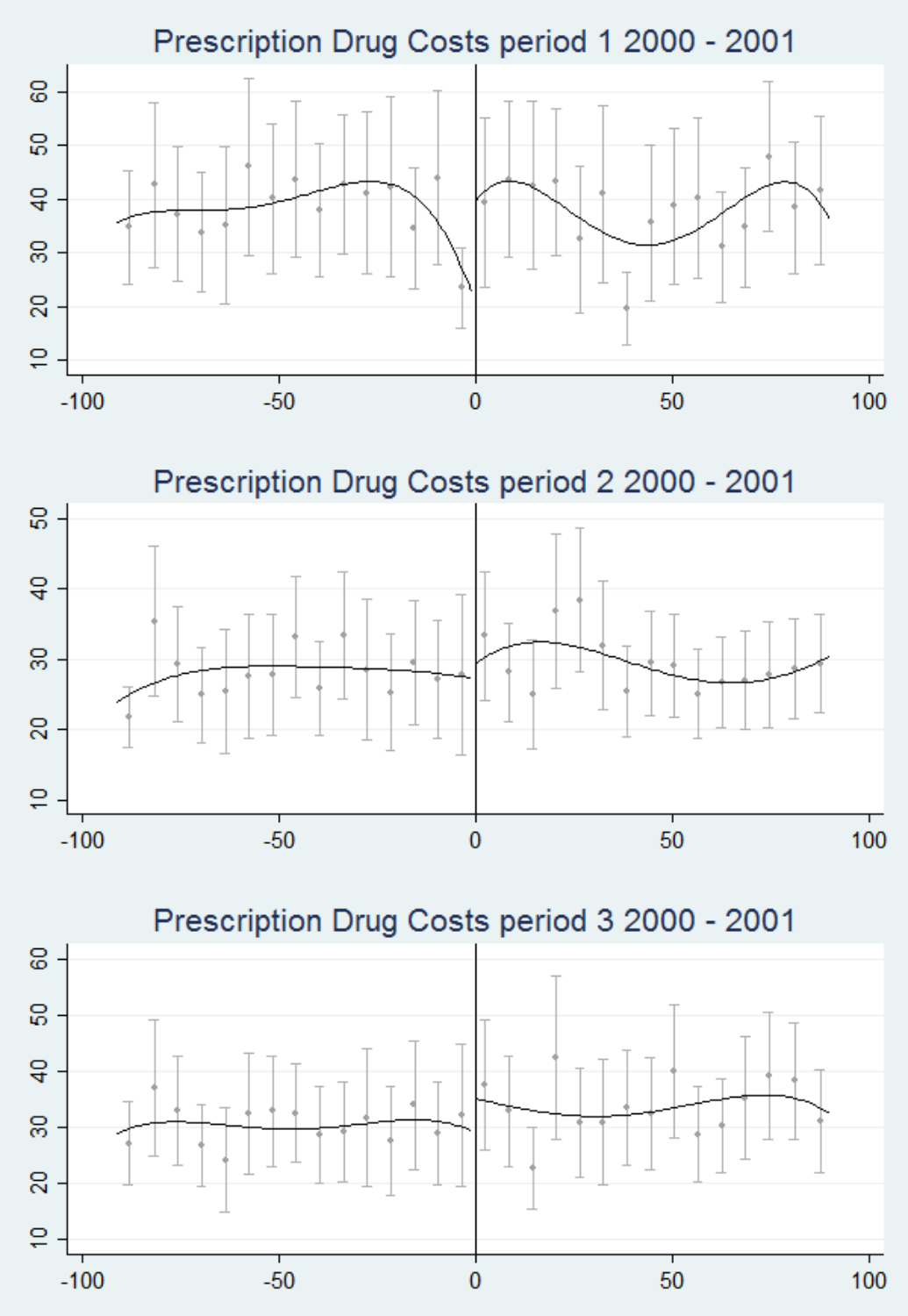
Note: Mental Health Costs represent total physician fees associated with psychological diagnostics for the given period. Period 1 is days -271 to -1, period 2 days 0 to 182, period 3 days 183 to 365. Error bars represent 95% confidence interval.

Figure 5.4B: Mental health costs in periods 4-6, 2005-2006



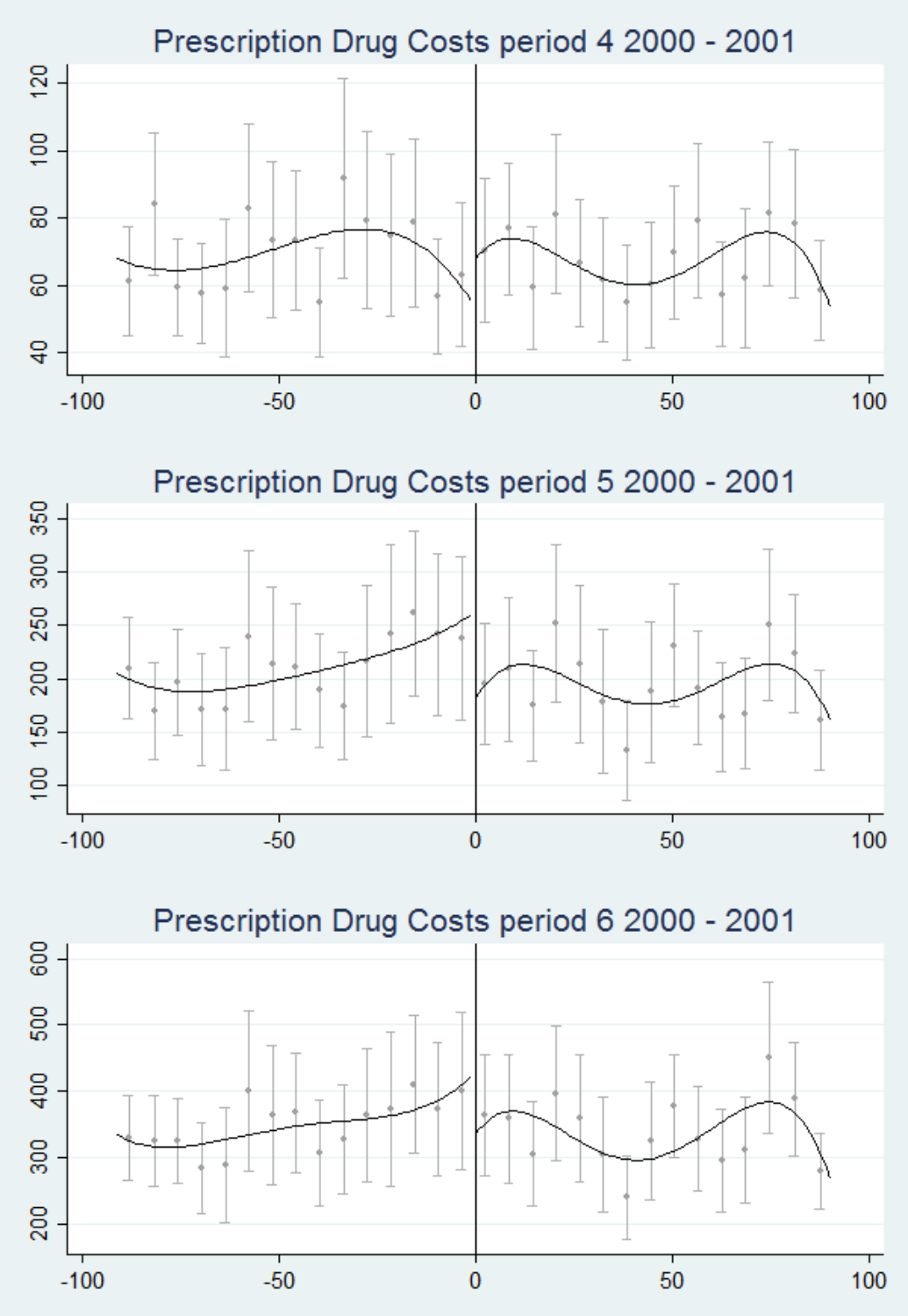
Note: Mental Health Costs represent total physician fees associated with psychological diagnostics for the given period. Period 4 is days 366 to 731, period 5 days 732 to 1826, period 6 days 0 to 1826. Error bars represent 95% confidence interval.

Figure 5.5A: Prescription drug costs in periods 1-3, 2000-2001



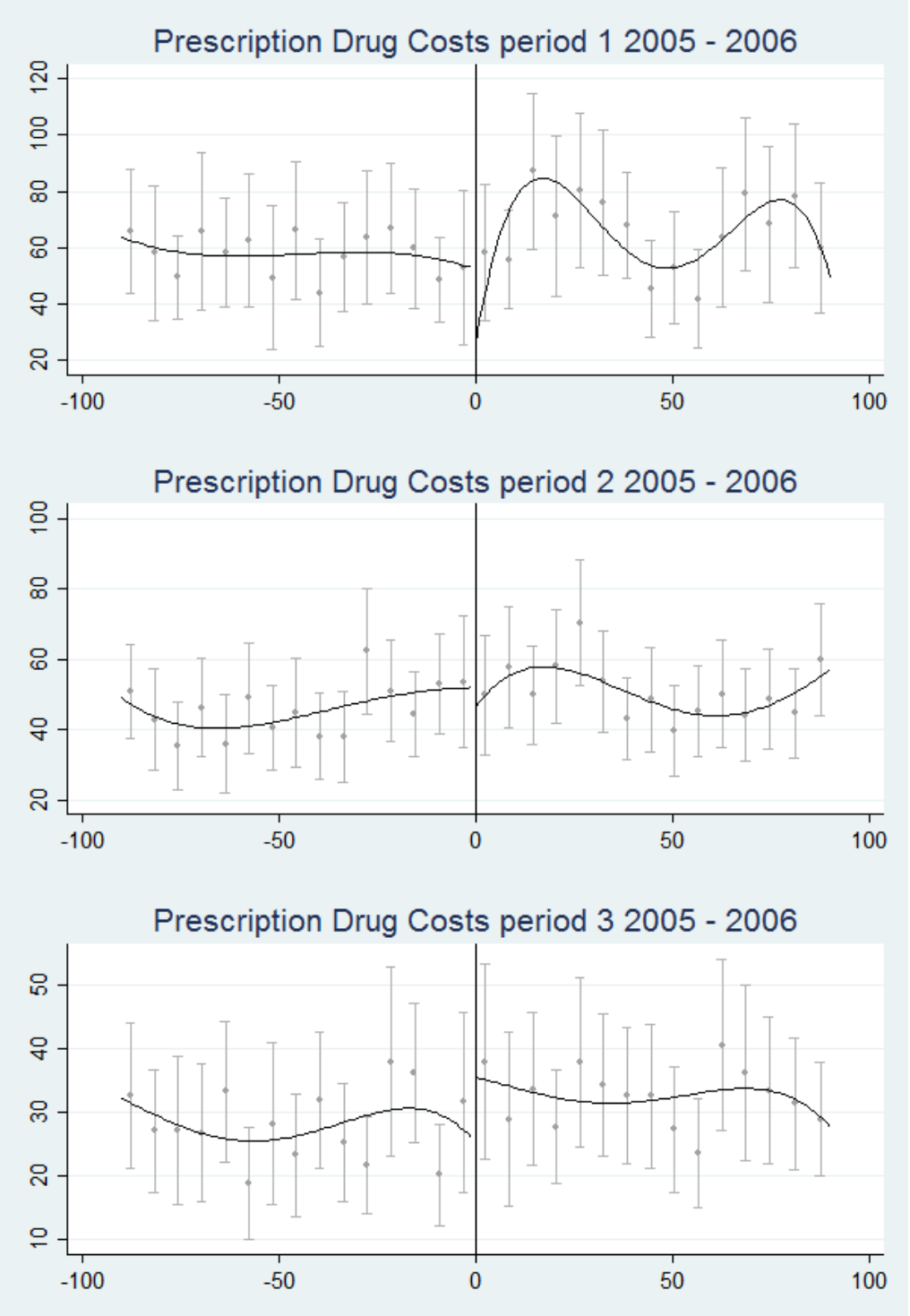
Note: Prescription Drug Costs represent total prescription drug costs net of individual contributions for the given period. Period 1 is days -271 to -1, period 2 days 0 to 182, period 3 days 183 to 365. Error bars represent 95% confidence interval.

Figure 5.5B: Prescription drug costs in periods 4-6, 2000-2001



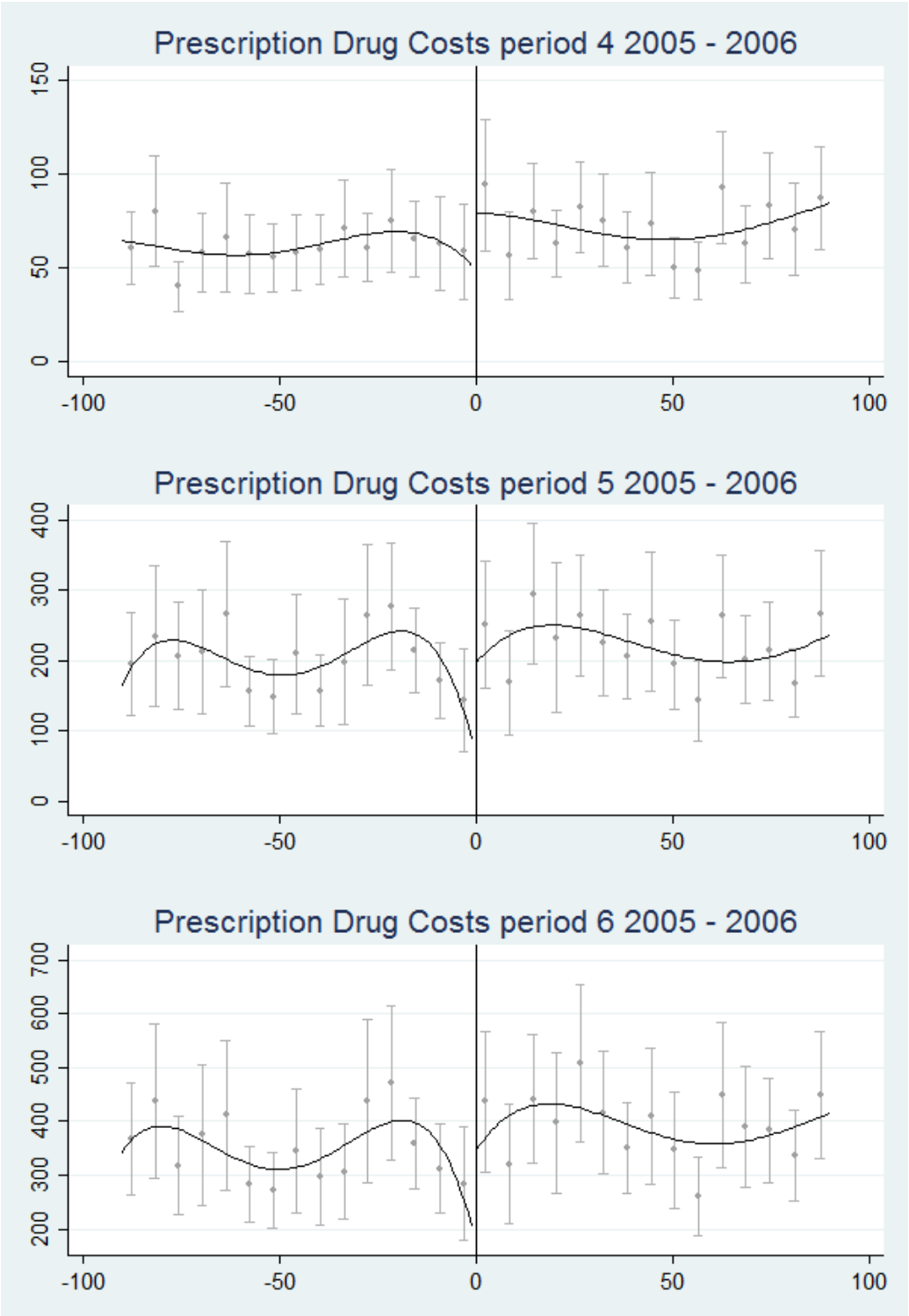
Note: Prescription Drug Costs represent total prescription drug costs net of individual contributions for the given period. Period 4 is days 366 to 731, period 5 days 732 to 1826, period 6 days 0 to 1826. Error bars represent 95% confidence interval.

Figure 5.6A: Prescription drug costs in periods 1-3, 2005-2006



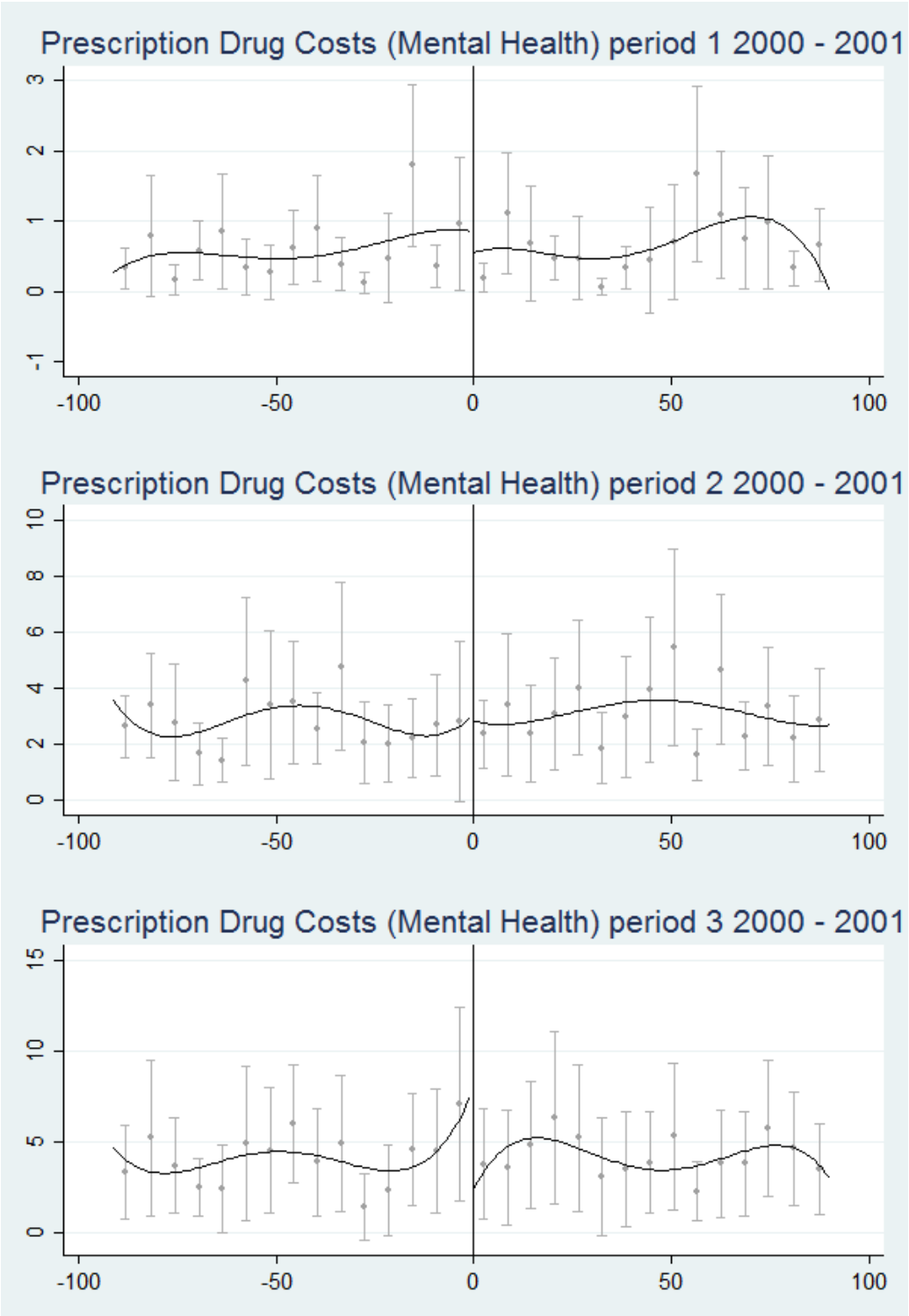
Note: Prescription Drug Costs represent total prescription drug costs net of individual contributions for the given period. Period 1 is days -271 to -1, period 2 days 0 to 182, period 3 days 183 to 365. Error bars represent 95% confidence interval.

Figure 5.6B: Prescription drug costs in periods 4-6, 2005-2006



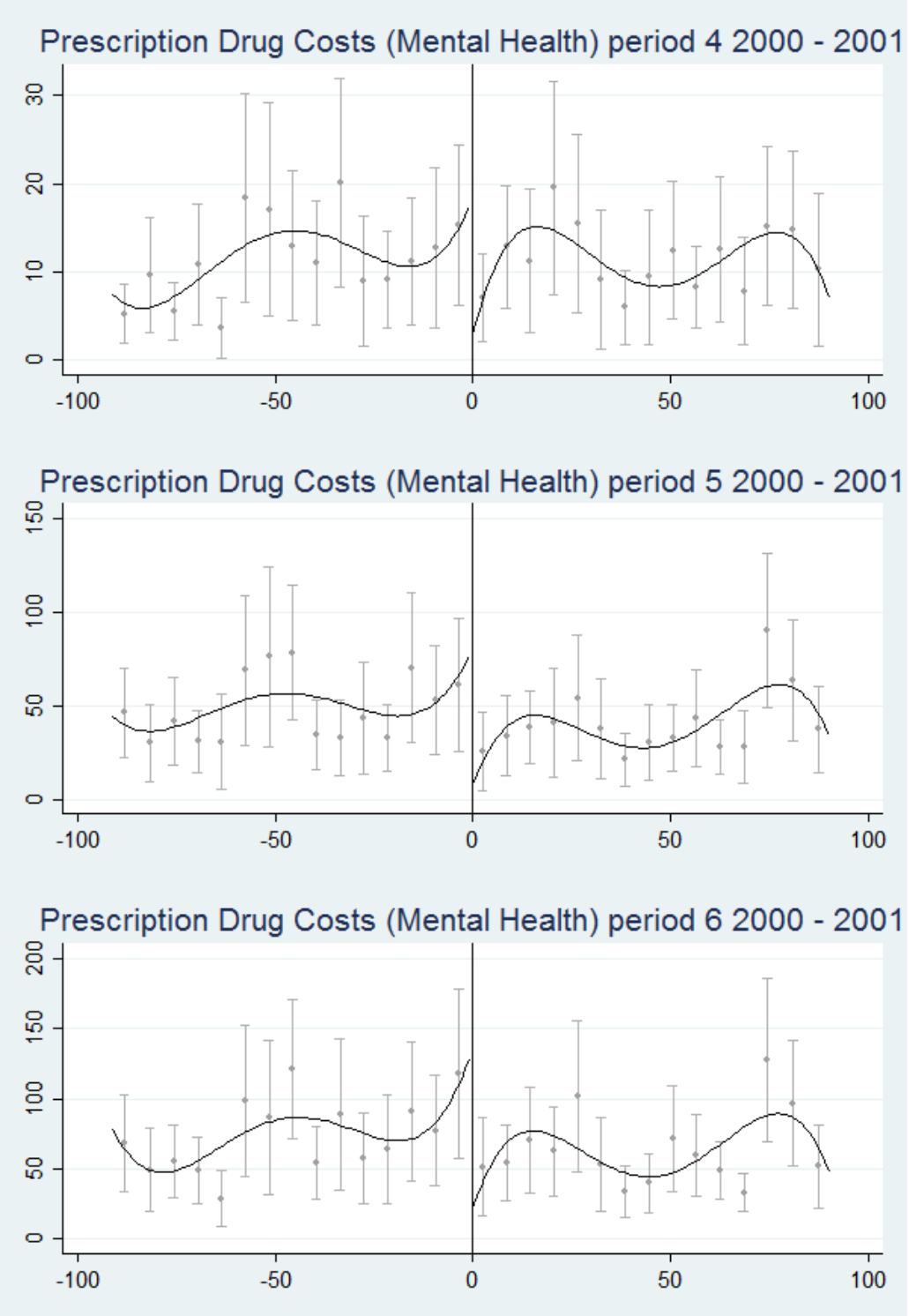
Note: Prescription Drug Costs represent total prescription drug costs net of individual contributions for the given period. Period 4 is days 366 to 731, period 5 days 732 to 1826, period 6 days 0 to 1826. Error bars represent 95% confidence interval.

Figure 5.7A: Mental health prescription drug costs in periods 1-3, 2000-2001



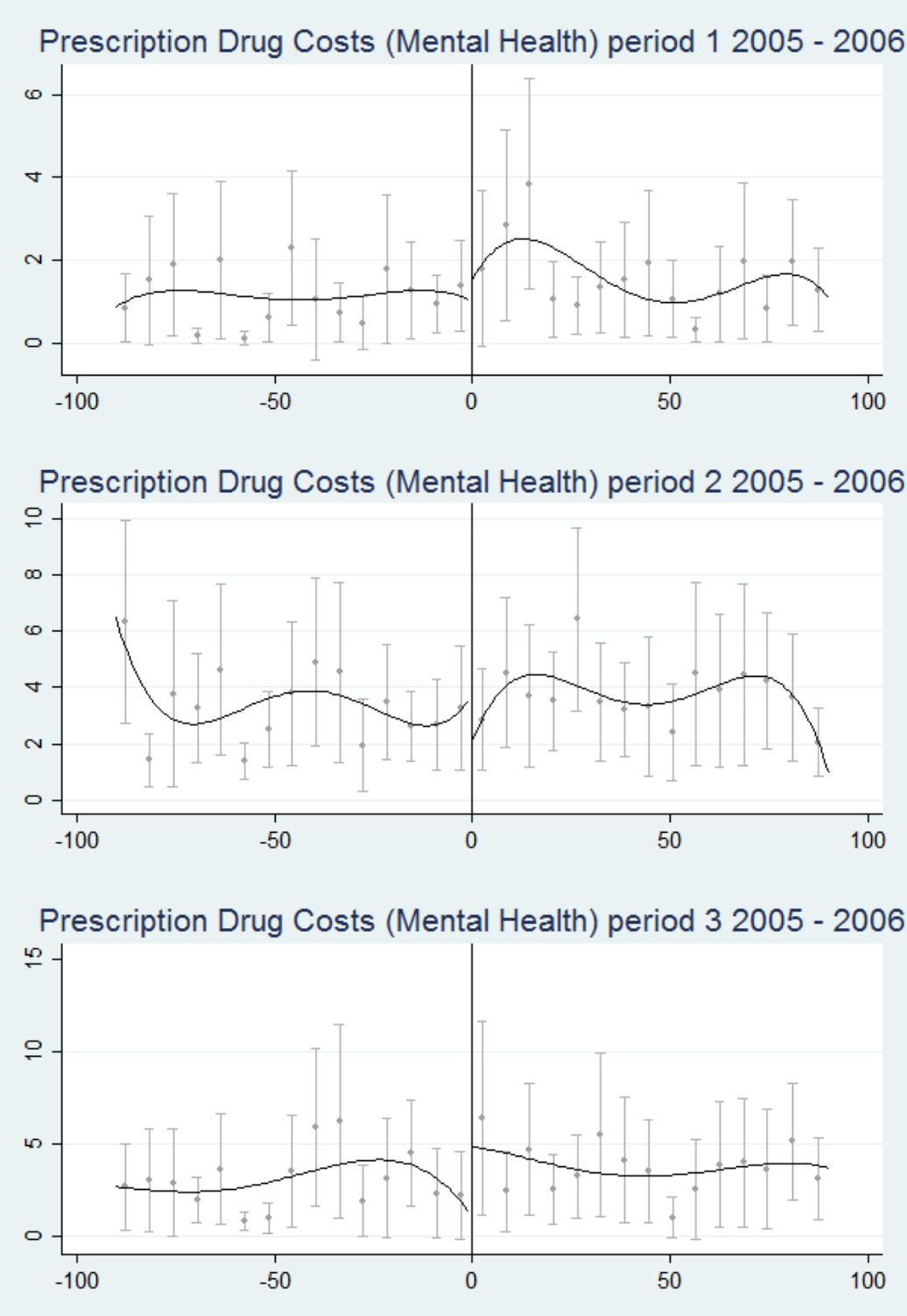
Note: Prescription Drug Costs (Mental Health) represent total mental health prescription drug costs net of individual contributions for the given period. Period 1 is days -271 to -1, period 2 days 0 to 182, period 3 days 183 to 365. Error bars represent 95% confidence interval.

Figure 5.7B: Mental health prescription drug costs in periods 4-6, 2000-2001



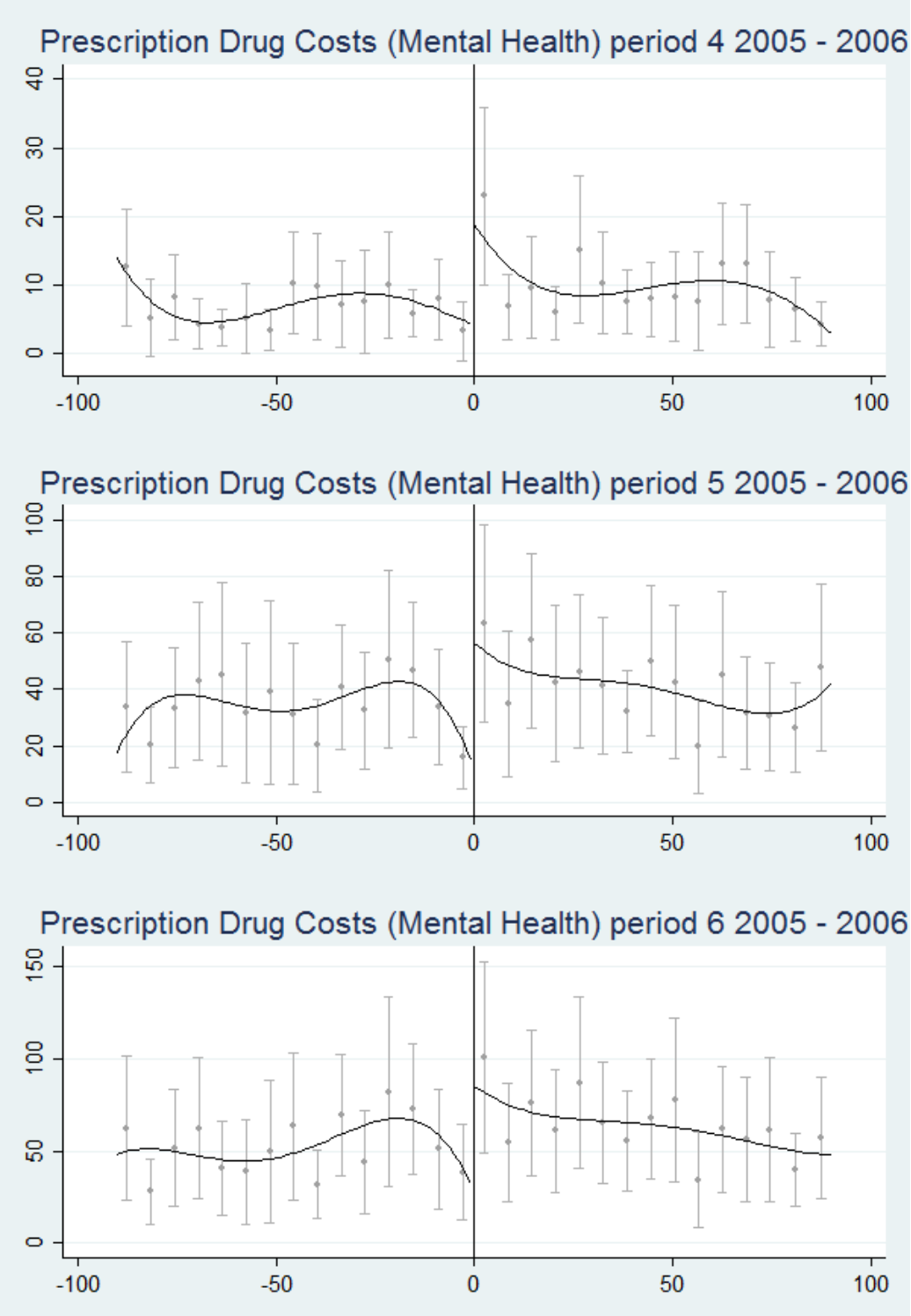
Note: Prescription Drug Costs (Mental Health) represent total mental health prescription drug costs net of individual contributions for the given period. Period 4 is days 366 to 731, period 5 days 732 to 1826, period 6 days 0 to 1826. Error bars represent 95% confidence interval.

Figure 5.8A: Mental health prescription drug costs in periods 1-3, 2005-2006



Note: Prescription Drug Costs (Mental Health) represent total mental health prescription drug costs net of individual contributions for the given period. Period 1 is days -271 to -1, period 2 days 0 to 182, period 3 days 183 to 365. Error bars represent 95% confidence interval.

Figure 5.8B: Mental health prescription drug costs in periods 4-6, 2005-2006



Note: Prescription Drug Costs (Mental Health) represent total mental health prescription drug costs net of individual contributions for the given period. Period 4 is days 366 to 731, period 5 days 732 to 1826, period 6 days 0 to 1826. Error bars represent 95% confidence interval.