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# Commentary/Commentaire

## The Town with No Poverty: The Health Effects of a Canadian Guaranteed Annual Income Field Experiment

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L'objet de cet article est double. Premièrement, il documente le contexte historique du MINCOME, une expérience canadienne en matière de revenu annuel minimum garanti réalisée de 1974 à 1979. Deuxièmement, grâce à des données provenant de dossiers de santé administratifs et à l'utilisation d'un modèle quasi expérimental, il indique que le taux d'hospitalisations chez les participants à cette expérience était de 8,5 % inférieur à celui d'un groupe témoin, et que cette différence était marquée surtout dans les cas d'accidents et blessures et de maladies mentales. Les résultats montrent aussi que, pendant l'expérience, les visites des participants chez le médecin, en particulier pour des questions de santé mentale, ont diminué et que plus d'adolescents ont poursuivi leurs études après la 12<sup>e</sup> année. Par ailleurs, les résultats n'indiquent aucune hausse du taux de natalité et du taux d'éclatement des familles, ni d'amélioration en matière d'issues de la grossesse. Je conclus qu'un revenu annuel garanti même modeste peut permettre d'améliorer la santé d'une population, entraînant ainsi des économies importantes pour le système de santé.

**Mots clés :** revenu annuel minimum garanti, dossiers administratifs, impôt négatif sur le revenu, résultats pour la santé, revenu de base, MINCOME, expérience sur le terrain

This paper has two purposes. First, it documents the historical context of MINCOME, a Canadian guaranteed annual income field experiment (1974 to 1979). Second, it uses routinely collected health administration data and a quasi-experimental design to document an 8.5 percent reduction in the hospitalization rate for participants relative to controls, particularly for accidents and injuries and mental health. We also found that participant contacts with physicians declined, especially for mental health, and that more adolescents continued into grade 12. We found no increase in fertility, family dissolution rates, or improved birth outcomes. We conclude that a relatively modest GAI can improve population health, suggesting significant health system savings.

**Keywords:** guaranteed annual income, administrative data, negative income tax, health outcomes, basic income, MINCOME, field experiment

## INTRODUCTION

The idea of a Guaranteed Annual Income (GAI) is once again receiving attention from policy-makers and decision-makers at local, provincial, and national levels. *In from the Margins*, a report of the Standing Senate Committee on Social Affairs (December 2009), made several recommendations for addressing poverty with a GAI. The idea of a GAI for people with disabilities was picked up by a House of Commons committee studying poverty, and in Quebec a government task force went further, recommending a minimum guaranteed income starting at \$12,000 for everyone in the province, a proposal that remains controversial.<sup>1</sup>

One context in which a GAI is attracting particular attention is among those charged with responsibility for public health.<sup>2</sup> It is well-known that poverty is one of the best correlates of poor health (Feeny et al. 2010; Marmot and Bell 2009; Marmot, Allen, and Goldblatt 2010; Morris et al. 2007; Pickett and Wilkinson 2009; Raphael 2007; Victorina and Gauthier 2009; Dahlgren and Whitehead 1991; Evans and Stoddart 1994; Marmot and Wilkinson 1999; CSDH 2008). It seems reasonable to ask whether a GAI, by reducing the prevalence of poverty in the community, might lead to better health outcomes and help to restrain the growing costs of treating poor health.

Canada has had a long flirtation with the idea of a GAI. Between 1968 and 1980, five field experiments were conducted in North America, primarily to investigate the impact of a GAI on the labour market. One of these experiments, MINCOME, was conducted in the province of Manitoba between 1974 and 1979 and had the distinction of being the only experiment to include a saturation site—the small town of Dauphin, Manitoba—in which everyone was entitled to participate in the experiment. For reasons discussed below, MINCOME ended without much analysis or a final report. This essay reports on our attempt to use routinely collected health administra-

tion data to determine what impact MINCOME may have had on population health.

## THE CULTURE OF THE PERIOD: GUARANTEED ANNUAL INCOME IN AMERICA

Canadian interest in a GAI during the 1970s paralleled American investigation of the idea. In the United States, the civil rights movement of the 1960s brought home to ordinary Americans the persistence of poverty despite the growth and prosperity of the postwar period. Activists in both countries began to question the status quo (Advisory Council on Public Welfare 1966). In the United States, the newly elected Democrats introduced several new programs. In 1961, Aid to Families with Dependent Children (AFDC) was amended to offer assistance to the unemployed. Food stamps were introduced in 1964, and the program was expanded in 1971 and 1974. Social Security amendments of 1962 and 1965 introduced federally funded social services and health care programs for welfare recipients and the retired. The Office of Economic Opportunity was created in 1964 to fight President Johnson's War on Poverty.

The distinguishing feature of the North American GAI experiments is that they were based on the idea of a negative income tax or refundable tax credit. Despite a GAI's appeal to advocates for social justice, its most well-known advocate in North America was Milton Friedman, who introduced the idea to readers in two *Newsweek* columns and championed the idea in his book *Capitalism and Freedom* (1962). Support, however, was very widespread (Baumol 1974, 1977; Green 1967; Tobin 1966; Tobin, Pechman, and Mieszkowski 1967).<sup>3</sup> Advocates saw a GAI as addressing several problems simultaneously. It would eliminate the "welfare trap" that discouraged individuals from leaving welfare rolls and created a strong disincentive to work in the form of very high effective tax rates. Existing social assistance programs were riddled with overlaps and gaps

that allowed some families to qualify under two or more programs while others fell between programs. A coordinated scheme offered as a GAI would eliminate these inconsistencies. The most intransigent poverty was that of the working poor, and a GAI would be more effective than existing schemes in reducing the prevalence of poverty among low-income workers. Finally, advocates argued, offering all income support schemes in a coordinated fashion and through a single bureaucracy would be more efficient than a set of parallel bureaucracies administering inconsistent and overlapping programs. Critics of a GAI worried that labour markets would suffer under a negative income tax scheme because individuals might reduce their work effort if they received a minimum payout even if they chose not to work. This last concern was the justification for developing a set of GAI experiments that could determine the effect of a GAI on work effort.

In the United States, the Office of Economic Opportunity (OEO) advocated a negative income tax as part of the anti-poverty plan it developed each year. However, traditional welfare advocates, located largely in the AFL-CIO, the Department of Health, Education, and Welfare (HEW), and the Department of Labor, were hesitant to adopt such a scheme and argued that the social security scheme first introduced in the 1930s had never been given adequate support or the necessary resources to address poverty. Far better to make incremental changes to existing programs, they argued, than to introduce an untested GAI scheme. As an alternative to the OEO call, they recommended increased minimum wages, unemployment insurance, expansion of AFDC, increased Social Security benefits, better manpower training, and full employment policies.

The OEO plan was introduced, debated, and put on hold from 1965 until 1969 when Johnson left office. Each year the latest plan was considered by a White House task force. Support for the scheme grew throughout the period. In 1965, Otto Eckstein of the Council of Economic Advisors chaired one of

the task forces and explored a number of variations of the scheme. A 1966 task force recommended that a presidential commission review plans for a negative income tax. While cautiously optimistic, these task forces feared political opposition and stopped short of advocating the implementation of the scheme. A commission chaired by Ben Heineman was established in 1968 and reported in 1969, after Johnson had left office. The Heineman commission recommended that the existing welfare scheme be replaced by a negative income tax. By then, however, the new president, Richard Nixon, had already declared support for a more limited form of welfare reform—the Family Action Plan (FAP).

When Nixon came to office, he appointed Donald Rumsfeld to head the poverty program, and Rumsfeld brought along an assistant, Dick Cheney. Robert Levine, one of the original experimenters who went on to work for the RAND Corporation, credits Rumsfeld for saving the poverty program by shifting it in a republican direction, toward “experimentation rather than action” (Levine et al. 2005, 98).

The American GAI experiments began under the OEO and continued within the Department of Health, Education and Welfare after the Nixon administration abolished the OEO (Levine et al. 2005, 97). The experiments’ main goal was to establish the size of the labour supply response to a GAI. As the data began to emerge, investigators began to ask other questions: How does a GAI affect human and other capital accumulation? What is the effect on family formation and fertility? How is health affected?

The first experiment was conducted on an urban population in New Jersey and Pennsylvania between 1968 and 1972. A second experiment was conducted in Gary, Indiana, to examine the effect of a GAI on single parents. A third experiment conducted in North Carolina and Iowa looked at the effects on rural populations. The final experiment was the

Seattle-Denver Income Maintenance Experiment (SIME-DIME), which had access to a much larger experimental population. These experiments were the first large-scale social experiments and were consciously modelled on techniques from the natural sciences: “We wanted to try *science* to find out something very specific” (ibid.). The researchers used a randomly selected experimental population and matched controls. They collected quantitative and qualitative data from both subjects and controls to determine the effect of the GAI on a wide variety of social behaviours.

The results of the experiments were debated in policy circles and in the media at two different times. In 1970, when the FAP was being debated in the House and Senate, the administration encouraged researchers to release results (Burke and Burke 1974). These preliminary results showed very modest labour market responses, but were dismissed by critics as premature. In the late 1970s, during the discussion of Jimmy Carter’s Program for Better Jobs and Income, the results again attracted attention. This time the modest labour market responses did not attract nearly as much attention as another finding: participants receiving a guaranteed annual income appeared to have a significant increase in the divorce rate relative to the controls.

The experiments generally found a 13 percent reduction in work effort from the family as a whole, with one-third of the response coming from the primary earner, one-third from the secondary earner, and the final third coming from additional earners in the family (Levine et al. 2005, 99). Because the primary earner typically worked many more hours than the secondary and tertiary earners, this implied a relatively small reduction in work effort by primary earners. Female spouses reduced their hours and re-entered the workforce less quickly after a break. The general result found in all the experiments was that secondary earners tended to take some part of the increased family income in the form of more time for household production, particularly staying home with newborns. Effectively, married women

used the GAI to finance longer maternity leaves. Tertiary earners, largely adolescent males, reduced their hours of work dramatically, but the largest decreases occurred because they began to enter the workforce later. This delay in taking a first job at an older age suggests that some of these adolescent males might be spending more years in school. The biggest effects, that is, could be seen as either an economic cost in the form of work disincentives or an economic benefit in the form of human capital accumulation.

The most challenging result, however, came in the form of controversial family dissolution rates in the SIME-DIME experiment (Hannan, Tuma, and Groeneveld 1977). These results seemed to imply that African American experimental families had a divorce rate 57 percent greater than the controls, while Caucasian experimental families had a divorce rate 53 percent greater than the controls. This finding caused Senator Moynihan, early on one of the strongest advocates for a GAI, to withdraw his support and was largely responsible for the failure of Jimmy Carter’s welfare reform scheme (Moynihan 1973). Further analysis of the data, published in 1990, rejected these findings as a statistical error, and no other experiment found any effect on marital stability (Cain and Wissoker 1990).

Other results were equally intriguing. In North Carolina, children in experimental families showed positive results in elementary school test scores. In New Jersey, data on test scores were not collected, but a positive effect was found on school continuation rates. In SIME-DIME there were positive effects on adult continuing education (Levine et al. 2005, 100). These results are all the more remarkable when juxtaposed to the academic literature that shows it is very difficult to affect test scores, dropout rates, or educational decisions by direct intervention.

Inconsistent attempts were made to collect health data, specifically on issues such as low birth weight, which can be associated with significant deficits in

later life. The Gary, Indiana, study found positive effects on birth weight in the most at-risk groups (*ibid.*).

By the late 1970s, the results showing very modest effects on work effort were portrayed as disastrous for the labour market. More extreme reactions came from Senator Williams from New Jersey, an opponent of the FAP, who argued that the experimental families were “double-dipping” and should be prosecuted for welfare fraud. David Kershaw, who was then running the experiments, went to great lengths to protect the confidentiality agreements that families had signed and prevented the congressional investigators unleashed by the General Accounting Office from seizing the files (Levine et al. 2005). Whatever the scientific merit of the experiments, the political moment for a general GAI in the United States had passed.

#### SOCIAL SECURITY REFORM IN CANADA

In Canada, social security was also being transformed. After World War II, family allowances were introduced. The Canada Pension Plan and its counterpart in Quebec, designed to augment Old Age Security and private pensions, was introduced in 1966, although planning had begun in the late 1950s. Throughout the 1960s, debates about universal health insurance culminated in a series of policy changes that saw all provinces with fully complying plans in place by 1972. Income support schemes remained the responsibility of the provinces, but the federal government increased its support of provincial plans throughout the 1960s.

The idea of a universal minimum level of income support for all Canadians was first recommended by the Croll Committee’s report in 1971. In the same year, the Castonguay-Nepveu Commission of Quebec suggested a similar scheme. In the early 1970s, a Social Security Review reintroduced the concept. On the basis of these proposals, the Canadian government, in partnership with the

Province of Manitoba, conducted a GAI experiment, MINCOME, between 1974 and 1979. At the time, it was widely believed that this experiment would serve as a pilot for a universal program, parallel to universal health insurance, that would revolutionize the ways in which Canadians pay taxes, receive benefits, and earn income. However, the oil shocks and persistent stagflation of the 1970s brought different governments to power at both the federal and provincial levels, and brought MINCOME to an end without implementation of the anticipated universal basic income proposal.

The idea was revived by the Royal Commission on the Economic Union and Development Prospects for Canada, known as the Macdonald Commission, which reported in 1986. The economic turmoil of the 1970s was past, but it had left a legacy in the form of a relatively large federal deficit and ongoing acrimony between the provinces and the federal government. In this context, the royal commission was established and given a broad mandate to examine all aspects of the ways in which the Canadian economy functioned. In 1982, the commission was appointed under the direction of the Right Hon. Donald Macdonald, formerly a senior federal minister in the energy and finance portfolios. One aspect of that overall review was to look again at the arrangements for social security provision across the country. Once again, a strong case for a GAI in Canada was made in the Macdonald Commission’s 1986 report and in several of its background research studies. The commission itself described its proposals as “radical, not cosmetic, and wholesale rather than tinkering at the margin” (vol. 1, 48). Once again the excitement generated by such a radical proposal did not translate into a universal basic income scheme, although subsequent governments continue to examine, build upon, and reinvent the idea.

The commission’s report (vol. 2, 778-83) documented what were widely perceived to be limitations with the current system: no national minimum standard for assistance and consequently differential



support levels between provinces; administrative inefficiencies that left some families eligible to receive benefits simultaneously from two or more different programs; a confusing array of programs that recipients often could not understand; and, most importantly, an inability to deal with the working poor. Welfare recipients were discouraged from moving from support to the labour market, since any earnings resulted in a dollar-for-dollar reduction in their benefits.

The commission attempted to address these defects with a Universal Income Security Program (UISP), which would “simplify and rationalize the existing aggregation of programs” (vol. 1, 49). Aware of the cost of social programs and the context of a federal deficit, the commission did not argue that social expenditures for income support should be reduced, but did suggest that there be “no increase in the cost of transfers and tax expenditures” (vol. 2, 795). Perhaps fearing public reactions, the commission insisted that its proposals should not be considered a guaranteed annual income scheme (ibid.). Nonetheless, a GAI is precisely what they proposed. The design of the program would see the UISP replace some existing programs. The program would be funded from reallocated program expenditures from the discontinued programs and therefore would impose no net cost. Families with annual earned income in the \$8,000 to \$12,000 range (in 1984 dollars) could expect an increase of \$5,000 to \$7,000. Families without other earnings could expect a provincially funded and administered “top-up” since the UISP would replace only federally mandated programs. In order to garner public support, the commission suggested that payments to young recipients might be dependent upon an active job search, demonstrated earnings, or participation in locally administered training programs. Moreover, payments to those under age 35 might be restricted to half the payout level of those over 35 (vol. 2, 798).

More than two decades have passed since the publication of the Macdonald Commission’s report,

and the fundamental problem of poverty amidst plenty persists in Canada, as evidenced by the recent call for further consideration of a GAI in the Senate Committee report *In from the Margins* (2009). The past few years have seen a re-emergence of interest among social agencies as well as some federal and provincial government departments in the idea of a wholesale reform of social security along the lines of a GAI.

## MINCOME IN CONTEXT

In March 1973, Manitoba submitted a proposal for funding of a full experiment (rather than an administrative test or pilot project) to the federal Department of National Health and Welfare. It contemplated a budget of \$17 million and expected to enrol over 1,000 families, with Ottawa paying 75 percent of the costs. On 4 June 1973, Manitoba and Canada formally signed an *Agreement Concerning a Basic Annual Income Experiment Project* covering cost-sharing and jurisdictional issues. The design of the project selected families from two experimental sites: Winnipeg and the rural community of Dauphin in western Manitoba. A number of small rural communities were also selected to serve as controls for the Dauphin subjects. The Winnipeg sample was designed along the same lines as the American experiments: subjects were randomly selected from Winnipeg and paired with matched controls from the same community. A major advantage of this design was that subject families were isolated from one another, which made it possible to vary the parameters of the negative income tax between families to get precise estimates of the impact of program design on work effort. The randomly drawn dispersed sample, and the use of matched controls, also made it possible to isolate the effects of the GAI and to draw conclusions about causation. The main goal was to gauge work response, and therefore the disabled, the institutionalized, and the retired were excluded from the Winnipeg experiment. This is the only part of the experiment that received research attention, and ultimately the findings were very similar to the

US findings: secondary and tertiary wage-earners tended to have a moderate labour market response, while primary earners showed little change in the number of hours worked in response to registration in the GAI (Hum and Simpson 1991).

The Canadian experiment, however, had one unique feature: it was the only experiment to contain a “saturation” site. Every family in Dauphin, with a population of approximately 10,000 and another 2,500 living in its rural municipality, was eligible to participate in the GAI. This time the elderly and the disabled were included as they would be in a universal program. The Dauphin site was explained as an attempt to answer questions about administrative and community issues in a less artificial environment (*ibid.*, 45). Michael Loeb, founding research director, also suggested that researchers anticipated that a relatively isolated community such as Dauphin might exhibit aggregate demand effects.<sup>4</sup>

The Dauphin cohort all received the same offer: a family with no income from other sources would receive 60 percent of the Statistics Canada low-income cut-off (LICO), which varied by family size. Every dollar received from other sources would reduce benefits by 50 cents. All benefits were indexed to the cost of living. Families with no other income who qualified for social assistance would see little difference in their level of support, but for people who did not qualify for welfare under traditional schemes—particularly the elderly, the working poor, and single, employable males—MINCOME meant a significant increase in income. Most important for an agriculturally dependent town with a lot of self-employment, MINCOME offered stability and predictability; families knew they could count on at least some support, no matter what happened to agricultural prices or the weather. They knew that sudden illness, disability, or unpredictable economic events would not be financially devastating.

The experiment quickly ran into financial difficulties (*ibid.*, 43-7).<sup>5</sup> The original budget proved very inadequate. The inflationary price increases

of the 1970s, coupled with a larger than anticipated unemployment rate, meant that the proportion of the total going to program expenses exceeded estimates and was not under the control of the researchers. The payments to families were inflation adjusted, but the budget was not. Costs for data collection also spiralled out of control because wages paid to staff were not entirely under the control of researchers. Analysis was the last claim on the budget, and it was funded from an ever-diminishing residual. These financial challenges occurred at the same time that the country itself was struggling with the economic challenges of the decade. Persistent unemployment and inflation that seemed to resist traditional remedies soon attracted more attention from the federal government than the problem of poverty which, while important, was also long-standing. Neither the provincial nor the federal government was prepared to put more resources into MINCOME, and new governments at the provincial and federal level turned their attention to what they perceived as more pressing issues.

Midway through the experiment, with political support for the GAI waning, the project was altered in two ways. First, research veered away from the original focus on work incentives towards administrative issues. Second, the project was directed to adopt an “archive” strategy. That is, researchers would collect and archive data, but not engage in analysis. The first response of the researchers was to cut peripheral research programs to protect the core. Originally, there were to be four foci: an economic program that centred on work incentives; a sociological program that looked at family formation, community cohesiveness, social attitudes, mobility, and the like; an administrative program; and a statistical program. The sociological program was the first to go. The researchers used ethnographic methods that were viewed with suspicion by the quantitatively oriented senior research staff. Research on the farm labour supply went next. It had always been seen as a concession to Manitoba agricultural interests but of no real interest or importance. It soon became clear that project resources



would not even allow reasonable estimates of labour supply responses.

In the end the project ran for four years, concluding in 1979, but the data collection lasted for only two years and virtually no analysis was done by project staff. New governments at both federal and provincial levels reflected the changing intellectual and economic climate. Neither the Progressive Conservative government of Joe Clark in Ottawa nor Sterling Lyon's Tories in Manitoba were interested in continuing the GAI experiments. The fate of the original data—boxes and boxes of paper files on families containing questionnaires related to all aspects of social and economic functioning—was unclear. They were stored in an unpublicized location by the Department of National Health and Welfare. In the end, only the Winnipeg sample, and only the labour market aspects of that sample, was ever made available. The Dauphin data, collected at great expense and some controversy from participants in the first large-scale social experiment ever conducted in Canada, were never examined.

## RECONSIDERING DAUPHIN

We believed the Dauphin saturation site had the unique capacity to illuminate quality of life issues consequent upon a general introduction of a GAI. However, the Dauphin data were not easily accessible; the National Archives housed a few obsolete tapes based on the labour market results from the Winnipeg sample and 1800 cubic feet of material that had not been entered into a database. We turned instead to a unique population health database maintained in Manitoba.

Many people have argued that income security is one of the social determinants of health (Dahlgren and Whitehead 1991; Evans and Stoddart 1994; Marmot and Wilkinson 1999). However, the precise pathways by which income influences health outcomes are less clear. Research has examined the

relationship between health and each of the related concepts of mean family income, income distribution, and the incidence of poverty. Our focus is on a slightly different dimension of economic well-being: income security, which is a concept distinct from income or socio-economic status. Income security, the guarantee that all participants can expect a basic annual income whether or not they work, gives people a longer planning horizon, allowing them to get beyond just making ends meet.

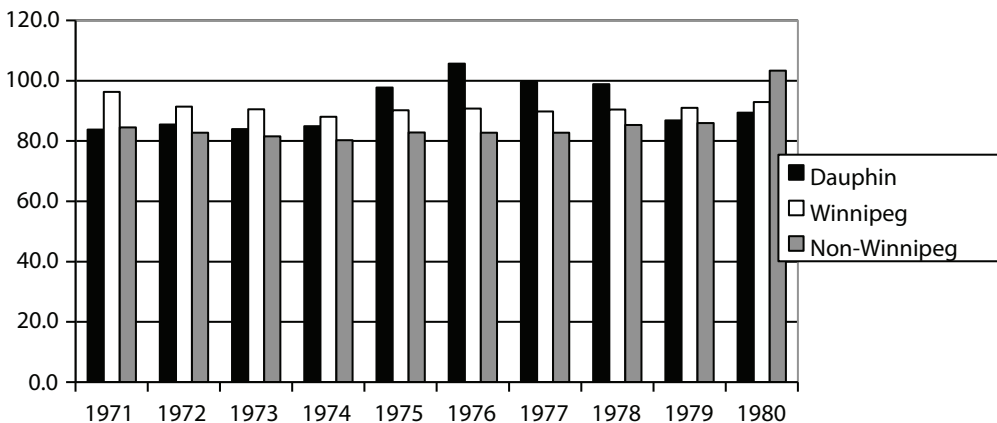
Income security is conceptualized in many different ways in the social science literature. Sometimes it is treated in a way that makes it virtually indistinguishable from socio-economic status or poverty (Luckhaus 2000). More often, it is conceived as periods of time on social assistance, or periods of time below some significant marker such as the Statistics Canada low-income cutoff (LICO) (Sandefur and Cook 1997; Yelowitz 1996; Harris 1996). We claim that income security exists when the risk of falling below a particular income level is minimized (cf. Bertola 2004). That is, we conceived of the GAI as an insurance policy. In the same way that people who buy fire insurance on their houses perceive the policy to be beneficial even if they never collect, the GAI benefited everyone in the saturation site, including families that never collected payments under the scheme. The benefit to those who did collect payments is obvious, but those whose incomes exceeded the threshold and therefore did not qualify still benefited from the reduction of risk. Because this is an agricultural community and even those working in other sectors had incomes dependent on harvests and agricultural prices, many people did not know with certainty in advance whether or not they would qualify for MINCOME stipends. The health and social benefits, including the willingness to encourage adolescent children to stay in school rather than encouraging them to work, are dependent on perceived risk and not directly on whether the family qualified for support after the fact. One of the effects that we expected might occur was that more adolescents, and especially more adolescent

males, might continue high school beyond the mandated age (Mallar 1977; Maynard 1977; Maynard and Murnane 1979; McDonald and Stephenson 1979; Rea 1977; Weiss, Hall, and Dong 1980). We accessed aggregate data on school continuation rates from the Department of Education, presented in Figure 1 below.

Money flowed to Dauphin families from MINCOME between 1974 and 1978. During the experiment, Dauphin students in grade 11 seemed more likely to continue to grade 12 than their rural or urban counterparts, while both before and after the experiment they were less likely than their urban counterparts and not significantly more or less likely than their rural counterparts to complete high school. Grade 11 enrolments as a percentage of the previous year grade 10 enrolments show a similar pattern. (We could not disaggregate by gender.) This figure is based on aggregate enrolment data provided by the Department of Education and does not control for underlying population dynamics. However, the population of Dauphin was stable, and there were no classification issues that we are aware of.<sup>6</sup>

Although Dauphin was a saturation site, only about a third of Dauphin families qualified for MINCOME stipends at any point, and because of the structure of the payment scheme, many of those stipends would have been quite small. Why, then, is the educational response so apparent in aggregate data? Two factors, we suspect, are at work. First, most children in high-income families already continued into grade 12 and graduated from high school. Most of the students at risk for leaving high school early were in low-income families that would have either received MINCOME stipends or believed there was a reasonable possibility that they would qualify for the stipends. Therefore, at-risk students were disproportionately likely to receive or to expect to receive income supplementation. Second, we suspect a social multiplier was at work. Students in grade 11 trying to decide whether to continue to grade 12 would consider two things. Anticipated family income, including MINCOME stipends, would be one. Young persons, however, would also consider whether their friends intended to stay in school; the more friends who decided to go on to grade 12, the more likely our subjects would

FIGURE 1  
Grade 12 Enrolment as a Percentage of Previous Year Grade 11 Enrolment



Source: Compilation by author.

as well. Therefore, it matters whether the families of their friends participated in the experiment. This study estimates the total treatment effect; we cannot separate out the direct effect from indirect effects that might operate through social networks or other market and non-market mechanisms (Scheinkman 2011). Ironically, the inability to randomize in a saturation site, far from being a liability, may have generated a response that would be invisible in a classic randomized experimental site.

### **The Population Data Repository**

The Manitoba Population Health Research Data Repository captures standardized data based on almost every physician and hospital contact in the province; this is data routinely collected for the administration of public health insurance. The information (including patient and family identification numbers, physician claims, diagnoses, costs, and hospitalization and institutionalization data) is maintained and controlled by the provincial department of health. All records deposited in the repository have been processed by Manitoba Health to remove patient identifiers such as name and address, while preserving the capacity to link records together to form individual and family histories of health care use. Individual demographics, including marital status and six-digit postal codes of residence, are updated every six months. The health records are linked to vital statistics, so dates of birth and death, as well as cause of death, are recorded (Roos et al. 1993; Roos and Nicol 1999).

The database extends from 1970, when universal health insurance was established in Manitoba. Although the richness of the database has increased over time, the outcome measures available for this study are limited to hospital discharge abstracts, physician claims, and vital statistics.

### **Selecting the Subjects and Comparators**

Subjects included everyone who listed a home address in the Municipality or the Rural Municipality of Dauphin continuously between January 1974 and December 1978. Individuals who were born or died

between January 1974 and December 1978 were included as long as they did not live elsewhere during the experiment. Individuals who moved into or out of Dauphin or its rural municipality during the period were excluded from both the experimental and control groups as they were not considered part of the experiment.

The perfect control for our research would have been a second community identical in all respects to Dauphin except that it did not receive the GAI. Such a community does not exist. We could have used several smaller communities as a control, as did the original researchers. However, because we were using health outcomes, it was essential to match closely on age and sex. Moreover, community controls would have imposed a difficult data problem. Not all community-level disturbances are reflected in databases, but researchers need to know when such events might be affecting data. By using control subjects drawn from a variety of communities, we could minimize the impact of such events in communities other than Dauphin simply by assuming that these effects offset one another in the aggregate. We took into account events that were specific to Dauphin as historians do—by reading newspapers and government reports and by talking to people who lived there.

We selected our dispersed control through a combination of hard-matching and propensity score matching. For every subject included, we selected three other Manitoba residents as a comparison group. First, we hard-matched on geography by removing from the database of potential matches all residents of Winnipeg (the only urban centre in the province), First Nations reserves,<sup>7</sup> some municipalities without reserve status but with large populations of First Nations or Métis residents, and people living in Northern Manitoba.<sup>8</sup> Winnipeg, with a 1971 population of 535,100, was omitted because access to health care, income, and lifestyle differed between Winnipeg and the rest of the province in the mid-1970s. The second largest town in Manitoba was Brandon, with a 1971 population

of 31,544; we kept Brandon in the database from which to select comparators because we assumed that it was more similar to the town of Dauphin, with a 1971 population of 12,173, than it was to Winnipeg. We took First Nations reserves out of the database because primary health care on reserve is a federal responsibility, and therefore residents accessing primary care on reserve will not appear in a provincial database. We excluded towns without reserve status that nonetheless had large proportions of First Nations or non-status Indian residents because these towns are often just outside reserves and residents sometimes access health care on the nearby reserve. We excluded Northern Manitoba because this sparsely populated region contains large numbers of highly mobile young men working in the resource industries, whose health care utilization patterns can be expected to differ substantially from those of residents of stable towns in the agricultural heartland of the province. We also removed all individuals who lived in Dauphin or its rural municipality for only part of the period 1974 to 1978 and lived elsewhere for the rest of the period. After these exclusions, we were left with small town and rural residents living in the southern and central parts of Manitoba—places very much like Dauphin and its rural municipality.

From the people remaining in the database, we used propensity score matching to select three comparators for every subject. Variables used for matching were limited by the data available to us in the data repository. Matching variables included year of birth, sex, number of people in the family, whether the family resided in a small town or a rural municipality, and whether the family was a single-parent, female-led family. Adding a fourth control reduced the quality of the controls significantly, but at three controls for every subject, the balance was excellent, with 99 percent matching exactly on sex and birth year.

We have no way to identify the ethnicity, religion, employment, or income of any individual in our health database, and previous research shows

all of these may be related to health utilization patterns. We therefore turned to the 1971 Census to determine whether there were any systematic differences between our subjects and comparators on variables that might affect the outcomes. We used community-level variables and weighted each community by the number of people in our comparison group who were drawn from that community. We then compared these weighted results with those for Dauphin and its rural municipality.

Of all the variables available to us from the 1971 Census, no income or employment variables were significantly different. There were systematic differences between subjects and comparators only in agricultural specialization and ethnicity.<sup>9</sup> Dauphin agriculture was slightly more specialized in canola cultivation than elsewhere in the province, with a significantly larger proportion of census farms reporting canola cultivation and a larger proportion of improved land devoted to canola production. However, agricultural differences, while significant, were small and in any case unlikely to be associated with outcome variables.

Ethnic and religious differences, however, could affect some social outcomes and, in particular, may have affected fertility and family formation outcomes. The proportion of the Dauphin population claiming Ukrainian heritage, and, consequently, Ukrainian Catholic or Ukrainian Orthodox religious affiliation, was greater than the proportion of those living in communities from which the comparators were selected. In order to control for ethnic and religious differences that we could not eliminate or measure directly between subjects and comparators, we designed a method to measure the impact of MINCOME that would adjust for these differences. Instead of simply measuring significant differences in outcome variables between subjects and comparators, we determined whether the gap between subjects and comparators increased or decreased during the experimental period. This method would also adjust for any systemic differences in access to health care as well as any other omitted variables

between subjects and comparators that we were not able to measure directly. The limitations of this approach are discussed below.

### Analysis and Results

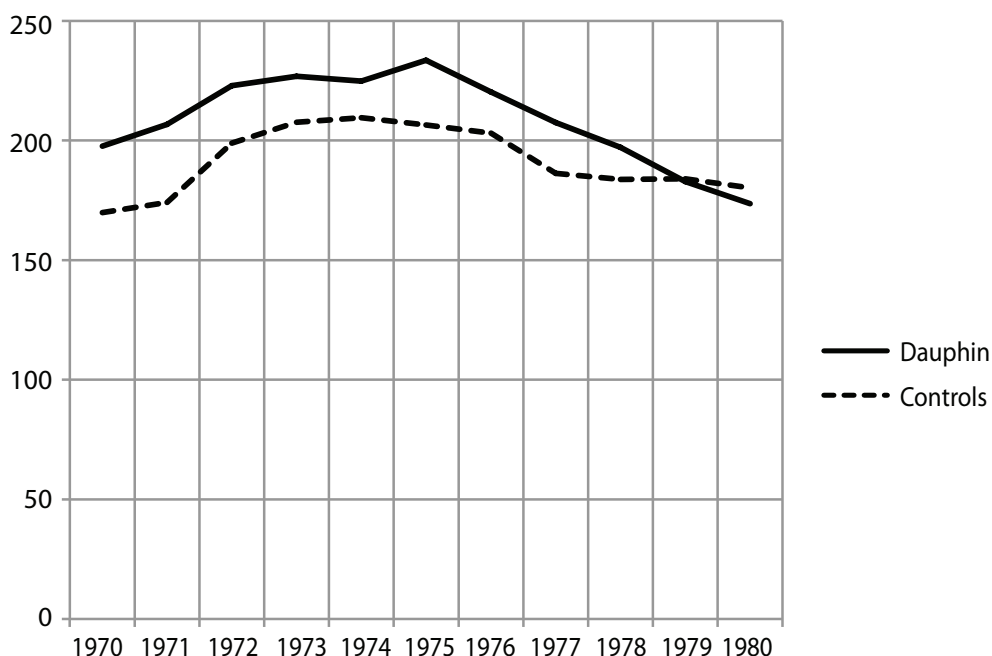
Our primary outcome variables relate to health care utilization. Hospitalization rates are generally a better measure of poor health than contact with physicians because patients tend to have less control over the decision to be admitted to hospital than they do over whether to consult a physician. Figure 2 displays annual hospitalization rates (hospitalizations per 1,000 residents) for Dauphin relative to the comparison group.<sup>10</sup>

While patterns in the raw data are less apparent than was the case for Figure 1, it is clear that

hospitalization rates were approximately 8.5 percent higher in Dauphin relative to the comparison group when MINCOME began in 1974, and that this differential was quite stable from the time medicare was introduced in 1970. During the project, the hospitalization rate began to fall in Dauphin relative to the controls, and by the end of 1978 there was no significant difference between experimental and control groups. Between 1973 and 1978, the hospitalization rate in Dauphin declined by 19.23 per 1,000 residents ( $\pm 2.096$  at the 95 percent confidence level).

In order to examine the data more systematically, we measured hospitalization and physician contacts at six-month intervals from 1970 to 1985. We constructed a segmented time series model and

FIGURE 2  
Hospital Separation Rates for Dauphin Residents and Controls



Source: Compilation by author.

examined hospital separations, all causes; hospital separations, accidents and injuries; hospital separations, non-congenital mental health; and physician visits.<sup>11</sup>

Table 1 presents definitions of independent variables. Parameter estimates are presented in Table 2.

The first column in Table 2 presents model results for the dependent variable “hospital separations.”<sup>12</sup> All variables except the binary variables “Mincom” and “Nomincom” are significant at the 1 percent level. Results suggest that before MINCOME began in 1974, the rate of hospitalization in Dauphin was significantly higher than the rate for the comparison group ( $\text{depend} > 0$ ). The interaction term ( $\text{yrmincom} * \text{depend}$ ) was significant and negative, which suggests that the gap between Dauphin residents and their comparators narrowed beginning in 1974 when the MINCOME money began to flow. By the end of 1978 there was no significant difference between Dauphin residents and the controls. The gap apparent before 1974 did not reopen before 1985 when we stopped following the subjects.<sup>13</sup>

None of the health or census variables that we examined could explain the persistent gap between subjects and controls before 1974, but we note that there was a fairly new hospital in Dauphin, which may have led to some supply-induced demand. Some, but not all, of the comparison group would have lived near a hospital, and it is certainly possible that some of the comparison group may have had less convenient access to hospitals than the Dauphin residents, leading them to forgo voluntary treatment. The gap may also reflect the influence of other variables for which we could not control, such as ethnicity. The outcome of interest, however, is the fall in hospital separations for Dauphin residents relative to the comparison group over the course of the MINCOME project.

We wondered whether these patterns would persist if we looked more carefully at particular causes of hospitalization that we expected to be especially sensitive to income insecurity. First, we examined the hospital separation rate for “accidents and injuries,” which are identified by ICD-9 codes<sup>14</sup> and include such things as workplace and

TABLE 1  
Definitions of Independent Variables

<i>Variable</i>	<i>Definition</i>
Intercept	
Depend	1 if the individual lived in Dauphin throughout 1974–78; 0 otherwise
Time_Seq	Sequence of six month time intervals from 1970–85 (1,2,3 ... 32)
Mincom	Binary variable defining MINCOME period (1974+)
Yrmincom	Sequence of six month time intervals beginning 1974 (1,2 ... 24)
Nomincom	Binary variable defining the period after MINCOME (1979+)
Yrnomincom	Sequence of six month time intervals beginning 1979 (1,2 ... 14)
Yrmincom*Depend	An interaction term that allows a differential rate of change between Dauphin subjects and the comparison group during and after the MINCOME period

Source: Compilation by author.



TABLE 2  
Segmented Time Series Model Outcomes Using a Negative Binomial Distribution

Variable	Hospital Separations		Physician Claims	
	Overall	Acc+Inj	Mental Health	Mental Health
Intercept	-2.5023* (0.0226)	-5.1478* (0.0502)	-6.0173* (0.0749)	-2.3815** (0.0613)
Depend	0.1336* (0.0150)	0.2062* (0.0340)	0.4923* (0.0464)	-0.1027 (0.0394)
Time_Seq	0.0292 * (0.0042)	0.0582* (0.0093)	0.0867* (0.0137)	0.0142 (0.0118)
Mincom	0.0439 (0.0254)	-0.1358 (0.0539)	-0.0433 (0.0768)	-0.0490 (0.0698)
Yrmincom	-0.0445 * (0.0052)	-0.0549* (0.0113)	-0.0844)* (0.0165)	-0.0086 (0.0144)
Nomincom	-0.0409 (0.0228)	0.0411 (0.0489)	0.2060 (0.0659)	0.0881 (0.0592)
Yrnomincom	0.0214* (0.0036)	-0.0135 (0.0076)	0.0342 (0.0104)	0.0199** (0.0094)
Yrmincom*Depend	-0.0107* (0.0013)	-0.0110* (0.0030)	-0.0315* (0.0037)	-0.0089** (0.0032)

Note: Parameter estimates are presented. Standard Errors are in parentheses. The negative binomial dispersion parameter was estimated by maximum likelihood.

\*Significant at 1 percent level

\*\*Significant at 5 percent level

Source: Compilation by author.

farm accidents, automobile accidents, and so on. We expected “accidents and injuries” to be sensitive to income security, both because we have found these codes to be related to socio-economic status in the past, and because many of the particular reasons one might be hospitalized with an “accident and injury” code are clearly related to the stress that might be induced by income insecurity. For example, farm or workplace accidents may be related to income insecurity if people continue to work in dangerous jobs when they are unwell or fatigued. Children suffer farm accidents if parents are unable to provide childcare during crucial harvest periods. Increased alcohol use may be associated with higher rates of

family violence, automobile accidents, assaults, suicide attempts, and so on. It is important to remember that these codes are assigned in small-town hospitals by people who are often neighbours, friends, or relatives of patients, and the precise nature of the accident or injury may be less clearly coded than it would be in a large city hospital, particularly if some socially sensitive issue is involved. Therefore, we did not attempt to break down “accident and injury” hospitalizations further.

Again, results seem feasible and consistent with the overall rates of hospital separations. This time there is a modest increase in “accident and injury”

hospitalizations over the entire period for both groups. Again, Dauphin residents enter the 1970s with a significantly higher rate of hospitalization than the comparison group, but this gap narrows over the MINCOME period, until by the end of it there is no significant difference between Dauphin subjects and the comparators. Again, the differential does not re-emerge during the period under consideration.

We wondered whether “mental health” hospital separations would follow a similar pattern. Again, we used ICD-9 codes to select relevant cases and omitted all “congenital” cases so that what we were left with were instances of hospitalization for anxiety disorders, clinical depression, personality disorders, and so on. Note that we include the hospitalization of individuals wherever they are hospitalized, so that even if an individual from Dauphin is hospitalized in a centralized provincial facility (in Winnipeg, for example), we capture that hospitalization. This may be of greater significance in the case of mental health hospitalizations, which tended to be more highly concentrated in particular facilities, especially during the 1970s.

Hospital separations due to mental health diagnoses follow a pattern very similar to that of accidents and injuries. Again, the initial gap reflects a greater hospitalization rate for Dauphin residents at the beginning of the MINCOME period that narrows during the period of the GAI and disappears by the end of the period.

The second broad category of health care utilization variables available to us relates to the use of physicians. Every contact with a physician results in an entry in the database that includes the reason for the visit and the amount billed. Hospital separation data are excellent measures of health status because individuals typically have limited control over whether they will be hospitalized. Physician contacts, however, are to a large degree under the control of individual patients. Therefore, rather than objective health status, physician claims might

represent a more subjective measure of health status, which might be sensitive to income insecurity.<sup>15</sup>

We examined overall physician claims, physician claims for “accident and injury” diagnoses, and physician claims for mental health diagnoses. Only the latter showed significant trends, and parameters are significant only at the 5 percent level. The pattern is similar to that of hospital separations for mental health diagnoses, with the trend for Dauphin residents falling relative to the comparison group during the MINCOME period.

Finally, we tried to determine whether the GAI was related to birth outcomes, fertility, or family dissolution in Dauphin. Keeley (1980a, 1980b) found positive effects on fertility, and Kehrer and Wolin (1979) found a reduction in low-birthweight infants in some urban centres in the American experiments. Hannan, Tuma, and Groeneveld (1977) claimed to have found an increase in family dissolution rates in the Seattle-Denver experiment, a finding contested by Cain and Wissoker (1990). The Manitoba data allow us to investigate, to some degree, each of these claims for the Dauphin subjects.

We found no evidence that fertility increased among Dauphin subjects relative to the comparison group. In fact, there is weak evidence of delayed childbirth among the youngest cohort of Dauphin mothers examined, although ethnic and religious differences between subjects and comparators make attribution of differences to MINCOME suspect. Table 3 shows the proportion of women with at least one child before age 25 by the mother’s birth cohort. The proportions were significantly different only for mothers born between 1967 and 1974 (Satterthwaite t-test (two-sided); 5 percent sig.).

Table 4 shows the mean number of children born to women in each age cohort before age 25. The mean number of children born to women before age 25 was significantly different between Dauphin subjects and controls only for mothers born between 1967 and 1974, with Dauphin women having significantly fewer babies (Satterthwaite t-test (two-sided); 5 percent sig.).

TABLE 3  
Proportion of Women with at Least One Child by Age 25

<i>Birth Cohort</i>	<i>Dauphin Subjects</i>	<i>Comparison Group</i>
1946–52	0.69579	0.69794
1953–59	0.54742	0.54545
1960–66	0.46804	0.48605
1967–74	0.44969	0.51091

Source: Compilation by author.

TABLE 4  
Mean Number of Children before Age 25 by Mother's Birth Cohort

<i>Birth Cohort</i>	<i>Dauphin Subjects</i>	<i>Comparison Group</i>
1946–52	1.20227	1.24295
1953–59	0.91181	0.93780
1960–66	0.66667	0.65969
1967–74	0.65723	0.81944

Source: Compilation by author.

If anything, women born between 1967 and 1974 who lived in Dauphin during the MINCOME period were significantly less likely than the comparison group to give birth before age 25 and had, on average, significantly fewer children before age 25. This seems to suggest delayed childbirth and may be indicative of lower lifetime fertility. These women would have been younger than seven at the start of MINCOME and no more than 11 when the experiment ceased. Their older sisters, born between 1960 and 1966, who would have been between eight and 14 at the beginning of MINCOME and between 11 and 18 at its end, were no less likely than their comparators to give birth early. This pattern makes it difficult to attribute declining early fertility to MINCOME. We note that

there were ethnic and religious differences between the Dauphin subjects and the comparison group and, while we could not isolate any factor to which we could attribute the difference, it is likely that changes in religious education or social behaviour unrelated to MINCOME might account for declining fertility.<sup>16</sup> One difference between our subjects and controls relates to religious affiliation and its potential impact on fertility. The speed of the social changes related to fertility that occurred in all rural areas during the 1970s may not have been uniform across the province. We found no documented changes in church teaching and were unable to document any systematic social changes that may have led to differential outcomes, but the possibility remains.<sup>17</sup>

One of the strongest claims made by individuals who advocate a GAI is that birth outcomes will improve; better nutrition and access to prenatal care, it is argued, will lead to healthier newborns. The only data we were able to use to determine birth outcomes were perinatal deaths—extremely rare events—and birth weight. The detailed birth records of recent years, with one and five minute APGAR scores<sup>18</sup> and other data, were not available for the mid-1970s. We tested for significant differences in low birth weight, at-risk birth weight,<sup>19</sup> and small-for-gestational age newborns born to Dauphin subjects and comparison group members during the MINCOME period. No significant differences were found. While numbers were small, we attribute this finding to the institutional features of the jurisdictions under study. Low birth weight is usually attributed to a lack of prenatal care and poor maternal nutrition during pregnancy. Universal health insurance existed during the MINCOME period in Manitoba and therefore, in principle, both our Dauphin subjects and the comparison group had equal access to prenatal care. Moreover, both Dauphin subjects and comparison group members lived in rural, agricultural areas of the province. Poverty rarely manifests as food insecurity in such settings where subsistence farming, hunting, and fishing supplement purchased food, and social organizations such as churches and clubs would have met residual need (Rhyne 1979).

The most politically charged outcome claimed by US researchers was that marital stability was undermined in jurisdictions that experimented with a GAI (Hannan, Tuma, and Groeneveld 1977). The argument, which held great sway in the US political debate, was that poor women, given a real choice by the existence of a GAI, would be less inclined to stay in unsatisfactory marriages. That finding was suspect from the outset<sup>20</sup> and was convincingly challenged by Cain and Wissoker who argued that statistical errors destroyed the credibility of the finding (1990). Nevertheless, we examined our data to see if family dissolution rates might be affected and

found no evidence of increased family dissolution rates among the Dauphin subjects.

The population health data repository is routinely updated every six months with family data, including residence of both parents and marital status. The currency and accuracy of the data, however, depend either on individuals calling Manitoba Health with new information or physicians updating information during routine interactions with the health care system. The latter happens regularly, but individuals who have few contacts with the health system have little incentive to update information. The data quality, therefore, may be suspect.

## CONCLUSIONS

We took advantage of an historical accident to re-examine the impact of a Guaranteed Annual Income in the small town of Dauphin, Manitoba, which served as the only saturation site in the five North American Negative Income Tax field experiments of the 1970s. Because universal health insurance was introduced in this jurisdiction just before the MINCOME experiment, we were able to access health administration data to determine whether population health might be affected by a GAI. We used a quasi-experimental design to determine whether contacts with the health care system declined among subjects who lived in the experimental community relative to a comparison group matched by age, sex, geography, family type, and family size. We found that overall hospitalizations, and specifically hospitalizations for accidents and injuries and mental health diagnoses, declined for MINCOME subjects relative to the comparison group. Physician claims for mental health diagnoses fell for subjects relative to comparators.

Overall, the measured impact was larger than one might have expected when only about a third of families qualified for support at any one time and many of the supplements would have been quite

small. This we attribute to social interaction. Because Dauphin was a saturation site, the involvement of friends and neighbours in the scheme may have led to changes in social attitudes and behaviours that influenced individual behaviour even among families that did not receive the supplement. This interaction may have reinforced the direct effects of income supplementation. We were unable to substantiate the claims of US research showing increases in fertility rates among subjects relative to controls, improved neonatal outcomes, or increased family dissolution rates.

These results would seem to suggest that a GAI, implemented broadly in society, may improve health

and social outcomes at the community level. At the very least, the suggestive finding that hospitalization rates among Dauphin subjects fell by 8.5 percent relative to the comparison group is worth examining more closely in an era characterized by concern about the increasing burden of health care costs. In 1978, Canada spent \$7.5 billion on hospital costs; in 2010 it was estimated to have spent \$55 billion—8.5 percent of which adds up to more than \$4.6 billion. While we recognize that one must be careful in generalizing potential health system savings, particularly because we use hospitals differently today than we did in 1978, the potential saving in hospital costs associated with a GAI seems worthy of consideration.

## APPENDIX

We found significant differences in the following variables in the 1971 Census (95 percent confidence level):

- Percent reporting Ukrainian heritage (31.22 percent in Dauphin; 10.43 percent comparators)
- Percent reporting religion as Ukrainian Catholic (16.70 percent Dauphin; 5.25 percent comparators)
- Percent reporting religion as Ukrainian Orthodox (9.61 percent Dauphin; 2.25 percent comparators)
- Percent improved land in rapeseed [canola] (9.36 percent Dauphin; 3.67 percent comparators)
- Percent census farms reporting rapeseed [canola] (46.92 percent Dauphin; 18.40 comparators)

We found no significant differences on the following variables:

- Average family income
- Percent families with less than \$2,000
- Average household income
- Percent households with less than \$2,000
- Average wage and salary income
- Median wage and salary income
- Percent wage and salary earners who are full-time, full-year
- Average male employment income
- Median male employment income
- Average female employment income
- Median female employment income
- Average male total income
- Median male total income
- Average female total income
- Median female total income
- Male unemployment rate
- Female unemployment rate
- Percent males (15+) who never worked
- Percent females (15+) who never worked
- Percent British Isles ethnicity
- Percent Native Indian ethnicity
- Percent French ethnicity
- Percent Polish ethnicity
- Percent German ethnicity
- Percent reporting religion as Roman Catholic
- Percent reporting religion as United Church
- Percent reporting religion as Mennonite
- Percent reporting religion as Anglican
- Percent reporting religion as Roman or Ukrainian Catholic
- Percent occupied dwellings owned by resident
- Average number of persons per room (all housing)
- Percent owner-occupied non-farm dwellings with no mortgage
- Percent improved land in wheat
- Percent census farms reporting wheat



- Average acres in wheat on farms reporting wheat
- Percent improved land in oats
- Percent census farms reporting oats
- Average acres in oats on farms reporting oats
- Percent improved land in barley
- Percent census farms reporting barley
- Average acres in barley on farms reporting barley
- Percent improved land in tame hay
- Percent census farms reporting tame hay
- Average acres in tame hay on farms reporting tame hay
- Percent improved land in flaxseed
- Percent census farms reporting flaxseed
- Average acres in flaxseed on farms reporting flaxseed
- Percent farms reporting cattle
- Average number cattle on farms reporting cattle
- Percent farms reporting pigs
- Average number pigs on farms reporting pigs
- Percent farms reporting chickens
- Average number chickens on farms reporting chickens
- Percent farms reporting laying hens
- Average number laying hens on farms reporting laying hens
- Percent farms reporting turkeys
- Average number turkeys on farms reporting turkeys
- Improved acres on census farm
- Percent improved acreage sprayed or dusted for insect or disease control
- Percent improved acreage dusted for weed or bush control
- Capital value per census farm
- Total sales per census farm
- Percent farms with sales > \$10,000
- Percent farms with sales < \$2,500
- Farm output/capital ratio
- Percent census farms owned by resident

## NOTES

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<sup>1</sup> A *Globe and Mail* article on the topic by Erin Anderssen published in November 2010 attracted 1,438 comments.

<sup>2</sup> The Public Health Agency of Canada (PHAC), for example, has established a working group on "upstream interventions" that is specifically examining the idea of GAI among other interventions.

<sup>3</sup> American economists have shown strong support for a GAI even after the field experiments of the 1970s. A 1979 survey reported in the *American Economic Review* found 92 percent of respondents supporting the statement "The government should restructure the welfare system along the lines of a negative income tax." When the same proposition was put to members of the National Tax Association in 1994, 86 percent of economics professors agreed, although a smaller proportion of other NTA members was supportive (Chalk 1996, 5; Kearn et al. 1979; Slemrod 1995).

<sup>4</sup> Email from Michael Loeb to the author (5 September 2005).

<sup>5</sup> In addition to referenced works, details of MIN-COME's operation come from discussions with Ron Hikel, the senior Manitoba civil servant charged with overseeing the experiment, and with research directors Michael Loeb and Derek Hum and other participants in the experiment.

<sup>6</sup> We looked specifically at the Indian residential school in Dauphin to ensure that our data were not picking up an influx of students into the public system, and we found no evidence that this occurred.

<sup>7</sup> Most, but not all, people living on reserve would have First Nations status, but not all First Nations people live on reserve.

<sup>8</sup> Northern residents were identified as those living in Statistics Canada Census Division 16.

<sup>9</sup> 95 percent level of confidence. Variables considered are listed in the Appendix.

<sup>10</sup> Hospitalization rates were calculated based on the Discharge Abstract Database for fiscal years (April 1 to March 31). Denominators were calculated based on number of subjects and number of controls, respectively, who were alive on 1 April.

<sup>11</sup> The models were run with the GENMOD procedure in SAS with a negative binomial distribution and the log population as an offset variable, which allows output to be represented as rates instead of counts.

<sup>12</sup> Hospital separations are separate events of hospitalization. The Hospital Separation Abstract that is completed for each hospitalization event includes up to ten diagnostic codes and number of days hospitalized, among other data.

<sup>13</sup> We did not allow for clustering of multiple observations of the same individual, so we are likely underestimating the standard error.

<sup>14</sup> We used ICD-9 codes because the longest run of health data has been coded as ICD-9. Over the period 1970–2008 the coding changed, and each transition requires careful consideration.

<sup>15</sup> There is no evidence to suggest that the ratio of physicians to population trended differently in Dauphin from that in the rest of the province.

<sup>16</sup> The files we pulled for analysis were limited to people who were alive between 1974 and 1978. Therefore, we were unable to determine whether this pattern persisted for younger age cohorts. We analyzed fertility by age cohort because there were too few births in any one year to test for significant differences.

<sup>17</sup> We interviewed Roman Bosyk, a Ukrainian Orthodox priest who lived in Dauphin during the period, who is currently dean of theology at St Andrew's College, Manitoba; he could think of nothing that should have led to differential fertility outcomes in Dauphin relative to the comparators. We suspect a greater general acceptance of birth control among all rural residents during the 1970s, and we note that the combined Roman and Ukrainian Catholic affiliations between subjects and comparators according to the 1971 Census is not significantly different. Nonetheless, we note the potential confounding.

<sup>18</sup> The APGAR score was devised by Dr Virginia Apgar in 1952 to assess the health of newborns. The attending physician evaluates the baby on five criteria (Appearance, Pulse, Grimace, Activity, Respiration) on a scale from zero to two, which are then summed to yield an APGAR score between zero and ten.

<sup>19</sup> "At-risk birth weight" includes both very small and very large babies, the latter often the consequence of gestational diabetes. Both categories are associated with poor health and with poverty.

<sup>20</sup> There were a number of issues with the finding, but one worth noting is that many of the families in the comparison group would have received AFDC, which specifically did not pay support to families with male heads, while the families receiving a GAI faced no such restriction. Intuitively, the AFDC families should have had the greater incentive to dissolve marriages.

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## 2011 Fellowship and Governor's Awards Recipients

The Bank of Canada is pleased to announce that Professors Randall Morck of the University of Alberta and Gregor Smith of Queen's University are the recipients of the Bank's 2011 **FELLOWSHIP AWARD**.

The Fellowship Award is designed to encourage leading-edge research, and to develop expertise in Canada in a number of areas important to the Bank's mandate: macroeconomics, monetary economics, international finance, financial markets and institutions, financial stability and regulation, labour economics, and economic growth.

The Bank is also pleased to announce that Professor Thorsten Koepl of Queen's University is this year's recipient of the **GOVERNOR'S AWARD**.

The Governor's Award recognizes outstanding academics, at a relatively early stage in their careers, who are working at Canadian universities in areas important to the Bank's mandate.

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## Lauréats de la Bourse de recherche et de la Bourse du gouverneur de 2011

La Banque du Canada a le plaisir d'annoncer que Randall Morck, professeur à l'Université de l'Alberta, et Gregor Smith, professeur à l'Université Queen's, sont les lauréats de la **BOURSE DE RECHERCHE** de la Banque pour 2011.

La Bourse de recherche est conçue pour encourager la recherche de pointe et développer l'expertise canadienne dans des domaines qui sont au centre du mandat de l'institution, soit la macroéconomie, l'économie monétaire, la finance internationale, les marchés financiers et les institutions financières, la stabilité et la réglementation financières, ainsi que l'économie du travail et la croissance économique.

La Banque est également heureuse d'annoncer que M. Thorsten Koepl, professeur à l'Université Queen's, est le lauréat de la **BOURSE DU GOUVERNEUR** de cette année.

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