

## The Role of Reinsurance in Financing Children’s Health Care Part II: Case Mix Effects

Many states are struggling to ensure that all children receive adequate health care. States often face challenges in attracting plans to deliver high-quality health care to children. Some plans are reluctant to serve children in state-sponsored programs because of the perceived financial risk of serving children, particularly those with special health care needs who are disproportionately represented in public health insurance programs. Because risk adjusting is unavoidably imperfect even when health status is fully accounted for, plans can suffer large financial losses even when the premiums they receive for serving children are risk adjusted.

Reinsurance can complement risk adjusting by providing protection against extreme financial losses. In limiting this downside risk, reinsurance also can reduce a plan’s incentive to avoid serving high-risk children whose medical needs may exceed projected needs. Reinsurance can serve this dual role of reducing financial risk and limiting incentives for favorable selection by limiting the share of exceptionally high health care expenditures on a child for which the plan is responsible. Under a common form of reinsurance, the plan bears the full cost of its expenditures on a child up to a threshold (known as the “attachment point”), but is responsible for only a fraction (e.g., 20 percent) of the expenditures on the child in excess of the attachment point.

Many states require health plans to purchase private or public reinsurance offered through the state.<sup>1</sup> Moreover, there is growing interest in reinsurance products, particularly with the state and/or federal government serving as

“...reinsurance – particularly reinsurance with low attachment points – reduced fairly substantially the largest financial loss...”

the reinsurer.<sup>2</sup> The role of government in providing reinsurance for high health care expenditures is receiving attention because of the rising numbers of uninsured, the difficulty that small businesses face in offering health insurance, and increasing insurance premium costs.<sup>3</sup>

The focus of our study was to examine the effects of reinsurance using health care claims and encounter data from twelve health plans participating in one State Children’s Health Insurance Program (SCHIP) between September 1, 2002 and August 31, 2003.<sup>4</sup> The effects of reinsurance can vary according to plan size (i.e., the number of children enrolled in the plan) and according to health status of a plan’s enrollees.

This Issue Brief explains how the key effects of reinsurance varied with the characteristics of the population of children a plan serves (i.e., with the plan’s case mix), holding plan size constant.<sup>5</sup> We distinguished primarily between: (i) high-profit plans that enrolled children for whom health care expenditures were relatively low, on average; and (ii) low-profit plans that enrolled children for whom expenditures were relatively high.

Our study produced three major conclusions. First, reinsurance increased modestly the (very low) average profit of low-profit plans while having little systematic impact on the (quite high) average profit of high-profit plans. Second, reinsurance – particularly reinsurance with low attachment points – reduced fairly substantially the largest financial loss incurred by the low-profit plans in our study. Third, reinsurance reduced modestly the variation in the profitability of serving different children, even after premiums were risk-adjusted to reflect demographic characteristics and health status. The reductions were somewhat more pronounced for the low-profit plans than for the high-profit plans.

### Study Methodology

These conclusions were derived as follows. First, we analyzed enrollment files and health care claims and encounter data for each of 494,103 children enrolled in the twelve plans we

studied. These data sets contained information about (1) the child’s demographic characteristics, including age and gender; (2) diagnoses assigned at the time of the health care encounters, which we used to categorize the child’s health status using the Clinical Risk Groups (CRGs);<sup>6</sup> and (3) the plans’ actual payments to providers for health care services rendered to the child during the sample year.

Second, we employed these data in multiple regression analysis to calculate risk-adjusted capitated payments (premiums) for the sample population. These premiums represent payments by the state to the health plan on behalf of the children being served. The premium for a child with a specific set of demographic and health status characteristics was set equal to the estimated cost of caring for a child with those characteristics. In this sense, the premiums covered the average health care expenditures associated with caring for children with those demographic and health status characteristics. However, due to unpredictable variation in

medical needs, a plan could not be certain that the premium it received on behalf of a child would match exactly the cost of the health care the child ultimately required.

Third, we calculated the net payment for each child in the sample,

"Five distinct attachment points – \$25,000, \$50,000, \$75,000, \$100,000, and \$150,000 – were analyzed."

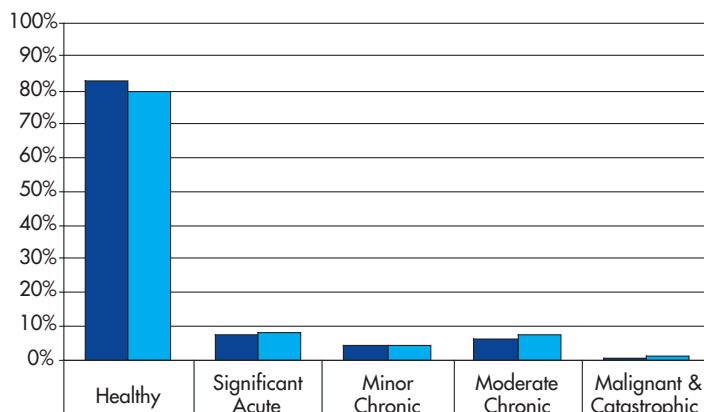
which facilitated our subsequent calculation of plan profit. A plan’s net payment for a child is the difference between the premium the plan receives from the state on behalf of the child and the plan’s health care expenditures for the child. A plan’s “profit” from participating in a children’s public health

insurance program is the sum of the net payments for all of the children enrolled in the plan. Notice that this measure of profit only includes revenues and expenditures directly associated with the delivery of health care services. This measure does not reflect advertising, marketing, capital, administrative or care coordination costs, for example.

Fourth, to examine how the effects of reinsurance vary according to the mix of enrollees in a plan, we ordered the plans in our sample from most profitable to least profitable. We then simulated high-profit plans and low-profit plans. The high-profit plans were simulated by drawing 25,000 children randomly from the enrollees of the second-most profitable plan in our sample.<sup>7</sup> As explained further below, this plan’s relatively high profit stems primarily from its relatively low health care expenditures. We repeated this random draw of 25,000 children one hundred times in order to simulate one hundred “high-profit” plans, each with 25,000 enrollees drawn from the population experienced by the representative high-profit plan selected from our sample. Similarly, 25,000 children were then drawn randomly one hundred times from the enrollees of the plan with the next-to-lowest profit in our sample. This procedure produced one hundred simulated “low-profit” plans, each with 25,000 enrollees.<sup>8</sup> One hundred plans of each type were simulated in order to provide both a reliable estimate of the average effects of reinsurance and a plausible estimate of the range of likely effects of reinsurance. Each plan was assumed to enroll 25,000 children in order to reflect the experience of a typical mid-sized health care plan.<sup>9</sup>

Figure 1 suggests that the different profit levels for the two plans selected from our sample stem from different levels of health care expenditures rather than from fundamental differences in

**Figure 1 Distribution of Enrollees Classified by Clinical Risk Group (CRG) Health Status Category.**



the health status of the populations the two plans serve. Notice, for example, that approximately 82% of the children enrolled in the low-profit plan were classified as “healthy,” whereas 79% of the children enrolled in the high-profit plan in our sample were classified as “healthy”. In addition, more than one percent of the high-profit plan’s enrollees had the most severe CRG classification, while less than one percent of the low-profit plan’s enrollees had this classification. However, the average annual per-child expenditure by the low-profit plan in our sample was \$883, which was nearly forty percent greater than the corresponding expenditure by the high-profit plan (\$632).

## Reinsurance

We analyzed the effects of reinsurance policies that varied according to their attachment point. Five distinct attachment points – \$25,000, \$50,000, \$75,000, \$100,000, and \$150,000 – were analyzed. The attachment point is the smallest level of health care expenditures for which some reinsurance protection is provided. The lower is the attachment point in a reinsurance policy, the greater is the financial protection the policy provides. Each of the reinsurance policies we analyzed entailed 20% cost sharing. In other words, under the policies we considered, the plan was responsible for all covered health expenditures on a child below the specified attachment point and for 20% of the expenditures on the child above the attachment point. The reinsuring entity pays directly the 80% of expenditures above the threshold.

To illustrate these reinsurance policies in more detail, consider the reinsurance policy with a \$75,000 attachment point. Under this policy, the health plan is responsible for all of a child’s covered health care costs until expenditures

**Table 1: Average Number of Enrollees with Expenditures Above the Attachment Point.**

Reinsurance Attachment Point	Low-Profit Plans	High-Profit Plans
\$150,000	2.0	0.0
\$100,000	4.1	3.9
\$75,000	7.7	7.0
\$50,000	19.2	14.0
\$25,000	63.1	28.7

**Table 2: Average Plan Reinsurance Reimbursement.<sup>11</sup>**

Reinsurance Attachment Point	Low-Profit Plans	High-Profit Plans
\$150,000	\$142,000	\$0
\$100,000	\$241,000	\$85,000
\$75,000	\$358,000	\$186,000
\$50,000	\$618,000	\$373,000
\$25,000	\$1,302,000	\$702,000

reach \$75,000, and for 20% of additional expenditures. If a plan with this reinsurance policy spent \$115,000 on health care services for a child, for example, the plan would be financially responsible for \$83,000 (= \$75,000 + 20% of [\$115,000 - \$75,000] = \$75,000 + \$8,000). The reinsurer (the state) would pay directly the portion of actual expenditures for which the plan was not responsible, \$32,000 (= 80% of [\$115,000 - \$75,000] = 80% of \$40,000).

Under all of the reinsurance policies we analyzed, premiums paid to the plans were reduced to offset the state’s expected reinsurance costs in the sample population as a whole, thereby making reinsurance neutral in its fiscal impact on the state’s overall costs for the children’s health care expenditures. In other words, reinsurance did not increase the state’s expected costs, nor did it alter the overall expected profits of the health care plans.<sup>10</sup> This funding

procedure is consistent with a policy in which the state employs the savings it secures from reduced premium payments to finance special care for children with particularly pronounced health care needs. For example, these children might be placed in a program that combines care coordination with expanded access to health care providers who specialize in the care of children with special health care needs.

**Tables 1 and 2** summarize the frequency and magnitude of reinsurance reimbursements for the simulated plans in our study. **Table 1** identifies by type of plan the average number of children for whom expenditures exceeded the specified reinsurance attachment point. **Table 2** presents the average reinsurance reimbursement received by the simulated plans in our study.

Four features of **Tables 1 and 2** warrant emphasis. First, the low-profit plans had more enrollees with expenditures above each attachment point than



the high-profit plans. Second, the low-profit plans spent substantially more than the high-profit plans on these “high-cost” enrollees, even when the two types of plans served a similar number of such enrollees. Third, less than one percent (approximately 0.18%) of the children served by the simulated plans had annual expenditures in excess of \$25,000. The low-profit plans served 69% of these children, while the high-profit plans served

31% of these children. Fourth, no high-profit plan spent more than \$150,000 on an enrollee, while, on average, the low-profit plans spent more than \$150,000 on the health care of approximately .01% of their enrollees.

**Table 3: Average Plan Profit With and Without Reinsurance.**

Reinsurance Attachment Point	Low-Profit Plans	High-Profit Plans
No Reinsurance	-\$2,333,000	\$4,278,000
\$150,000	-\$2,326,000	\$4,185,000
\$100,000	-\$2,321,000	\$4,194,000
\$75,000	-\$2,294,000	\$4,218,000
\$50,000	-\$2,219,000	\$4,237,000
\$25,000	-\$1,994,000	\$4,137,000

**Table 4: Smallest Plan Profit With and Without Reinsurance.**

Reinsurance Attachment Point	Low-Profit Plans	High-Profit Plans
No Reinsurance	-\$4,621,000	\$3,231,000
\$150,000	-\$4,324,000	\$3,140,000
\$100,000	-\$4,115,000	\$3,217,000
\$75,000	-\$3,956,000	\$3,309,000
\$50,000	-\$3,647,000	\$3,436,000
\$25,000	-\$3,099,000	\$3,464,000

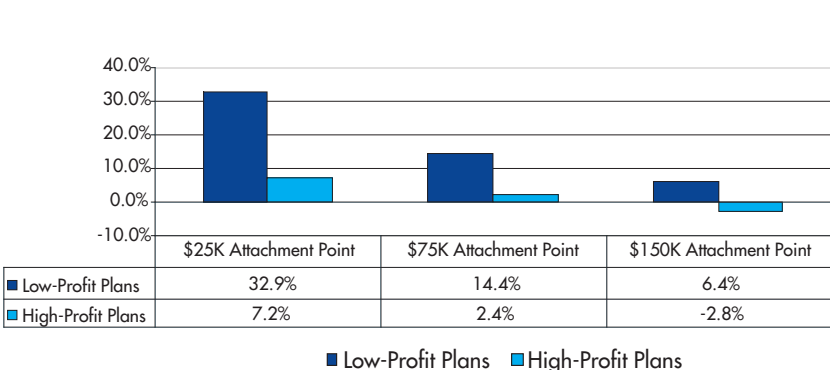
## The Effects of Reinsurance on Plan Profits

As explained above, one important potential benefit of reinsurance is its ability to limit particularly large financial losses that health care plans might otherwise incur. **Table 3** identifies how reinsurance affected the average profit associated directly with the delivery of health care services in the state-sponsored children’s health insurance program for the simulated plans in our study. Two features of **Table 3** warrant emphasis. First, reinsurance with a \$150,000 attachment point had little impact on the average financial loss incurred by the typical low-profit plan. This modest level of reinsurance reduced the average loss of the simulated low-profit plans from -\$2,333,000 to -\$2,326,000, or by approximately 0.3%. In contrast, reinsurance with a \$25,000 attachment point reduced the average financial loss incurred by the low-profit plans by 14.5%, from -\$2,333,000 to -\$1,994,000.

Second, reinsurance at all levels resulted in a modest reduction in the average profit of the high-profit plans. The profit for these plans decreased because the high-profit plans secured relatively little reinsurance reimbursement, but received the lower premiums that were reduced to offset the reinsurance reimbursements paid to all of the plans, on average.

Reinsurance had more pronounced impacts on the *smallest* profit earned by the low-profit plans in our study. **Table 4** reveals how the smallest profit earned

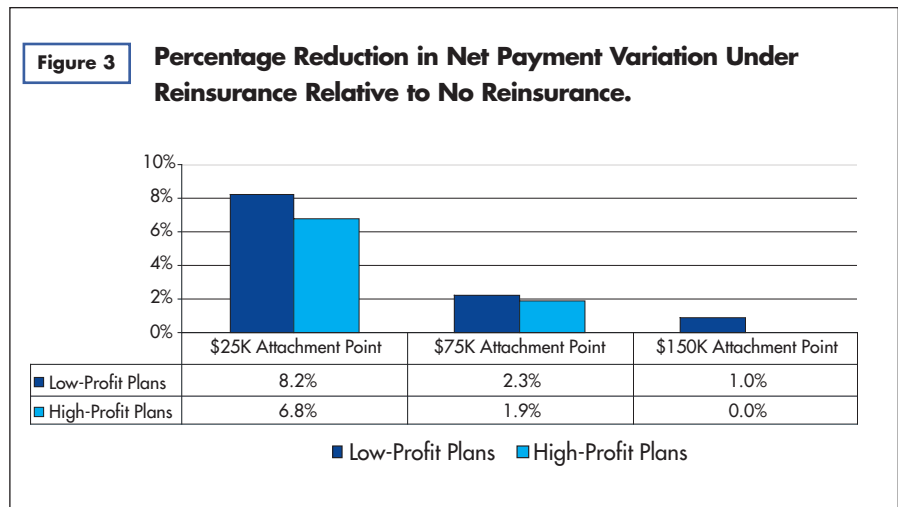
**Figure 2** Percentage Increase in the Smallest Plan Profit Under Reinsurance Relative to No Reinsurance.



by the low-profit and high-profit simulated plans in our study varied with the reinsurance policy in effect. **Figure 2** presents the corresponding percentage changes in the smallest plan profit relative to the profit secured in the absence of reinsurance. For clarity and simplicity, **Figure 2** presents only the impact of reinsurance with attachment points of \$25,000, \$75,000, and \$150,000.

Three features of **Table 4** and **Figure 2** warrant emphasis. First, even in the absence of reinsurance, all of the high-profit plans earned substantial profit on their delivery of health care services. In contrast, the least profitable low-profit plan incurred a loss in excess of \$4.6 million. This large loss on the delivery of health care services arose even though premiums were risk-adjusted to reflect both demographic and health status characteristics and set to match health care expenditures, on average. Second, reinsurance systematically increased the smallest profit of the low-profit plans. In contrast, reinsurance had little systematic impact on the profit of the high-profit plans. The lack of a systematic effect reflects the interplay of two opposing effects: while reinsurance reduced (modestly) the magnitude of the health care expenditures for which the high-profit plans were financially responsible, it also reduced the premiums paid to the plans, in order to offset the reinsurance expenses incurred by the state.

Third, as the attachment point in the reinsurance policy increased, the largest loss incurred by a low-profit plan declined systematically. Relative to no reinsurance, reinsurance with a \$150,000 attachment point reduced the largest loss incurred by a low-profit plan by 6.4%. The corresponding reductions in the largest financial loss for the low-profit plans as the attach-



**Table 5: Average Number of Enrollees with Expenditures Above the Attachment Point.**

Reinsurance Attachment Point	Low-Profit Plans	High-Profit Plans
No Reinsurance	\$964	\$646
\$150,000	\$955	\$646
\$100,000	\$949	\$640
\$ 75,000	\$942	\$634
\$ 50,000	\$926	\$623
\$ 25,000	\$885	\$602

ment point declined to \$100,000, \$75,000, \$50,000, and \$25,000 were 11.0%, 14.4%, 21.1%, and 32.9%, respectively.

### The Effects of Reinsurance on Variability in Net Payments

In addition to reducing pronounced financial losses, reinsurance may limit incentives for favorable selection. When net payments differ substantially across children, plans can increase their earnings and reduce their financial losses by enrolling children for whom net payments are expected to be large and positive while avoiding children for

whom net payments are expected to be very negative. Reinsurance can dampen a plan's incentive to engage in such favorable selection to the extent that it limits substantial variation in net payments.

**Table 5** and **Figure 3** reveal the extent to which reinsurance reduced the average variation in net payments for the simulated plans in our study.<sup>12</sup> **Table 5** identifies the nominal effects. **Figure 3** presents the corresponding proportionate effects of reinsurance on net payment variation, relative to net payment variation in the absence of reinsurance.

Three aspects of **Table 5** and **Figure 3** warrant emphasis. First, as

expected, reinsurance systematically reduced the average variation in net payments. For all plan types, net payment variation declined as reinsurance protection increased. Second, the reduction in net payment variation was somewhat more pronounced for the low-profit plans than for the high-profit plans. The more pronounced reduction in net payment variation for the low-profit plans arises in part because children with the highest expenditures were enrolled disproportionately in these plans. Third, and perhaps most importantly, reinsurance did not produce dramatic reductions in net payment variation. The largest reduction (for the low-profit plans under the reinsurance policy with a \$25,000 attachment point) was only 8.2%.

for the low-profit plans than for the high-profit plans.

Despite the combined effects of reinsurance and health-based risk adjustment, the low-profit plans still sustained substantial losses on the delivery of health care services through the state-sponsored health insurance programs in our study. These losses were related in part to higher plan expenditures

“...the optimal structuring of reinsurance policies and the optimal plan choice among available reinsurance policies may be quite subtle and intricate in practice.”

ings indicate that the optimal structuring of reinsurance policies and the optimal plan choice among available reinsurance policies may be quite subtle and intricate in practice. Second, alternative reinsurance policies will be analyzed, including policies that cap the maximum expense for which a plan is financially liable.<sup>13</sup> Reinsurance policies of this sort can provide greater protection against particularly large financial losses than the protection provided by the reinsurance policies considered in our study.

Third, possible behavioral effects of reinsurance will be analyzed. When a plan is held responsible for a smaller fraction of its health care expenditures, it may deliver expanded health care services to its enrollees. The benefits and costs of such behavior merit careful analysis. Fourth, the effects of voluntary and mandatory reinsurance will be compared. In our study, reinsurance was mandatory, a common reinsurance policy was provided to all plans, and premiums were reduced symmetrically for all plans to offset the cost of the reinsurance. While this policy reduced the maximum financial loss incurred by low-profit and high-profit plans alike, it reduced the average profit of high-profit plans. Consequently, some high-profit plans might opt out of the reinsurance policy if they were permitted to do so.<sup>14</sup> The effects of voluntary reinsurance, like the effects of plan-specific reinsurance obtained through private negotiations between individual plans and private reinsurance providers, remain to be explored in detail.

## Conclusions

In summary, our study of the effects of reinsurance produced three major conclusions.

1. Reinsurance increased modestly the (very low) average profit of low-profit plans while having little systematic impact on the (quite high) average profit of high-profit plans.
2. Reinsurance, particularly reinsurance with low attachment points, reduced fairly substantially the largest financial loss incurred by the low-profit plans.
3. Reinsurance reduced modestly the variation in the profitability of serving different children, even after premiums were risk-adjusted to reflect demographic characteristics and health status. The reductions were somewhat more pronounced

on enrollees with special health care needs. Whether these higher expenditures contributed to improved outcomes for the children and their families, improved quality of life, and/or reduced financial burden on families by reducing out-of-pocket spending warrants further exploration. Financing strategies to promote better quality of care will be examined in future research.

Future research also will extend our analysis in the following four directions. First, the effects of reinsurance on plans with more moderate profit levels will be examined. Preliminary study suggests that these effects can vary substantially with small variations in the case mix of the moderate-profit plans. These find-



## References

---

- <sup>1</sup> Kaye, N. 2001. *Medicaid Managed Care: A Guide for States*. 5th Edition. Portland: Maine; National Academy of State Health Policy and NASHP.
- <sup>2</sup> Blumberg, L.J., Holahan, J. 2004. Government as Reinsurer: Potential Impacts on Public and Private Spending. *Inquiry*. 41:130-143.
- <sup>3</sup> Freudenheim, M. and Pear, R. 2004. Momentum Builds for U.S. Role in Paying Highest Health Costs. *The New York Times*. October 23, 2004.
- <sup>4</sup> The state is not identified here to help preserve confidentiality of key data.
- <sup>5</sup> Our companion Issue Brief reviews how the effects of reinsurance vary with plan size. The National Center on Financing for Children with Special Health Care Needs. *The Role of Reinsurance in Financing Children's Health Care, Part I: Plan Size Effects*.
- <sup>6</sup> The CRGs are a categorical clinical system that classifies individuals according to their diagnosed health status. The CRGs include nine core health status groups: healthy, significant acute, minor chronic, multiple minor chronic pairs, single dominant or moderate chronic, multiple significant chronic pairs, chronic triplets, catastrophic, and metastatic malignancy. These categories can be collapsed into the following five groups for analytic and descriptive purposes: healthy, significant acute, mild chronic conditions, moderate chronic conditions, and malignant and catastrophic conditions. Neff, J.M., Sharp, V., Muldoon, J., Graham, J., Popalisky, J., Gay, J. 2001. "Identifying and Classifying Children with Chronic Conditions Using Administrative Data with the Clinical Risk Group Classification System." *Journal of Ambulatory Pediatrics*. 2(1): 72-79. The CRGs used in our June 2001 – May 2002 sample reflect CRGs assigned in the preceding year, June 2000 – May 2001. The CRG assignment required that children over 1 year of age be enrolled for at least half of the relevant year and that children under 1 year of age be enrolled for at least three months.
- <sup>7</sup> We employed the second-most profitable plan in our sample, rather than the most-profitable plan, as the basis for our simulated "high-profit" plans in order to avoid inadvertent modeling of extreme, unrepresentative experiences.
- <sup>8</sup> Again, we chose the plan with the next-to-lowest, rather than the lowest, profit in our sample in order to avoid modeling extreme, unrepresentative experiences. All sampling in our study was conducted with replacement. The average profits for the two types of simulated plans are presented in Table 3.
- <sup>9</sup> Our companion Issue Brief explains how the effects of reinsurance vary with plan size. See note 5 above.
- <sup>10</sup> For simplicity in this initial study, we assumed that plans' health care expenditures on individual children did not change as the terms of the prevailing reinsurance policy changed.
- <sup>11</sup> The numbers in Table 2 (and in Tables 3 and 4) are rounded to the nearest thousand.
- <sup>12</sup> The measure of variation that we employed is the mean absolute deviation (MAD) of a plan's net payments. This measure is the average of the differences between a plan's net payments and its mean net payment, where all differences are expressed as absolute values. Alternative measures of variation – including variance and standard deviation – produced similar conclusions.
- <sup>13</sup> See, for example, Lutzky, A. and Bovbjerg, R. 2003. *The Role of Reinsurance in Medicaid Managed Care*. Center for Health Care Strategies Resource Paper. Washington D.C.: The Urban Institute.
- <sup>14</sup> Other authors have noted that risk can be spread more broadly across plans when reinsurance is mandatory and provided by a single entity (e.g., the State). See, for example, Blumberg, L. and Holahan, J. 2004. "Government as Reinsurer: Potential Impacts on Public and Private Spending."





INSTITUTE FOR  
**CHILD  
HEALTH  
POLICY**  
UNIVERSITY OF FLORIDA

## **National Center on Financing for CSHCN**

### **Institute for Child Health Policy Project Team**

Elizabeth Shenkman, Ph.D.  
PRINCIPAL INVESTIGATOR

Bruce Vogel, Ph.D.  
Lise Youngblade, Ph.D.  
CO-PRINCIPAL INVESTIGATORS

Sema Aydede, Ph.D.  
David Sappington, Ph.D.  
John Nackashi, M.D., Ph.D.  
CO-INVESTIGATORS

Donna Hope Wegener, M.A.  
PROJECT COORDINATOR

### **University of Rochester Project Team**

Peter G. Szilagyi, M.D., M.P.H.  
CO-PRINCIPAL INVESTIGATOR

Andrew W. Dick, Ph.D.  
Sheryl Ryan, M.D., M.P.H.  
Laura Shone, M.S.W., Dr.Ph.  
CO-INVESTIGATORS

### **Project Partners**

Ruth E.K. Stein, M.D.  
CO-PRINCIPAL INVESTIGATOR  
ALBERT EINSTEIN COLLEGE OF MEDICINE

Conni Wells  
FLORIDA INSTITUTE FOR FAMILY INVOLVEMENT

Nora Wells  
FAMILY VOICES

Neva Kaye  
Cynthia Pernice  
NATIONAL ACADEMY FOR STATE HEALTH POLICY

The National Center on Financing for CSHCN is funded by a Cooperative Agreement (#U93MC00179) with the Maternal and Child Health Bureau, Division of Services for Children with Special Health Care Needs, U.S. Department of Health and Human Services, Health Resources and Services Administration.

 UNIVERSITY OF  
**FLORIDA**  
[www.ichp.ufl.edu](http://www.ichp.ufl.edu)

