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ABSTRACT

A database was assembled from data collected on all people served by the Developmental Disabilities divisions of Nebraska, South Dakota, and Wyoming, including state institutions and state-funded programs (n=5,928). Information included provider expenditures associated with each individual, allocations made by individual reimbursement rates, services/supports received, funding sources, and individual characteristics as measured by the Inventory for Client and Agency Planning. Results from the analysis found institutions had the highest costs. Although Home and Community-Based Service recipients experienced lower levels of independence than people funded with state money, their costs were higher. South Dakota's people had the highest independence scores. This was attributed to their relatively high utilization of supervised apartments and supported living. Wyoming's costs and rates were higher than those for the other two states, presumably a result of the "Weston v. Wyoming" lawsuit. Supported employment was less expensive than community facility-based daytime programs but this finding was not consistently found in all states. South Dakota, which had a relatively higher utilization of supported employment, also had significantly higher supported employment costs. Evidence substantiated a diseconomy of scale function, as costs increased steadily with agency size. (Contains 23 references.) (CR)

State of Wyoming

Department of Health

Analysis of Costs, of Services/Supports for People With Developmental Disabilities for Nebraska, South Dakota, and Wyoming, USA

Garry L. McKee, Ph.D., M.P.H., Director

August 4, 2000

State of Wyoming
Department of Health

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Analysis of Costs, of Services/Supports for People With Developmental Disabilities for Nebraska, South Dakota, and Wyoming, USA

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Running Head: EXPLAINING COSTS

Abstract

A database was assembled from data collected on all people served by the Developmental Disabilities divisions of Nebraska, South Dakota, and Wyoming, including State institutions, and state-funded programs (n=5,928). Information included provider expenditures (costs) associated with each individual, allocations made by individual reimbursement rates, services/supports received, funding sources, and individual characteristics as measured by the Inventory for Client and Agency Planning. Stepwise regression was used to select a set of orthogonal measures, which explained a relatively high percentage of the total variation in costs (R^2=.75). Those predictors were then used in a series of covariance analyses, comparing states and funding sources on costs, rates, and residential independence. All things being equal: Institutions had the highest costs. Although Home and Community-Based Services (HCBS) recipients experienced lower levels of independence than people funded with State money, their costs were higher. South Dakota's people had the highest independence scores. This was attributed to their relatively high utilization of supervised apartments and supported living. Wyoming's costs and rates were higher than those for the other two State's, presumably a result of the *Weston v. Wyoming* lawsuit. Supported employment was less expensive than community facility-based daytime programs; but this finding was not consistently found in all states. South Dakota, which had a relatively higher utilization of supported employment, also had significantly higher supported employment costs. Evidence substantiated a diseconomy of scale function, as costs increased steadily with agency size. The discussion outlined a procedure, which would adapt the present model to other settings with similar data. This could be done to increase the equitability in payment amounts between individuals or providers.

Introduction

Our earlier work demonstrated significant relationships between geographic variables, individual characteristics, residential settings, and funding sources in expenditures by provider agencies ("costs"), and in state allocations to those providers ("rates") (Campbell & Heal, 1995; Campbell, Fortune & Heinlein, 1998; Fortune, Heinlein, & Fortune, 1995). Funding source differences indicated that state-owned institutions were the most costly and community services funded solely by state funds were the least costly. Among community-based organizations, cost bore a U-shaped relationship to organization size, with intermediate-sized (101-200 persons served) organizations being the least costly. Other authors have also found these variables, separately or in various combinations to be important (Knobbe, Cary, Rhodes, & Horner, 1995; & Emerson, et al., 2000). The former study found community residential costs to be lower than institutional costs. On the other hand, the latter study reported that costs of residential campuses in the United Kingdom were lower than comparable costs associated with "dispersed housing schemes," even when statistically controlling for adaptive and "aberrant" behavior. They did, however, also report small but significant relationships showing increased needs, as measured by the ABS, were associated with increased costs.

Being able to account for the relationships, which have a strong role in determining costs could present several new advantages for the policy maker. Many comparisons could be made empirically, while statistically controlling for many factors, which have previously been the sole province of anecdotal information. This ability could be valuable for policy makers who have the imagination to use the following types of information: *Other things being equal*: 1) States, funding sources, providers, etc. could be compared on costs and/or rates. 2) Costs/rates can be compared between various models of

residential or daytime services/supports. 3) Other measurable constructs such as "independence", "consumer outcomes," and "consumer satisfaction," could be compared between funding sources, service/support models, etc. 4) The applicability of such economic concepts as "economy of scale" could be examined, holding other related measures constant. 5) Finally, allocations (reimbursement rates) could use such models to assure that payments to states, funding agencies, provider agencies, and/or individuals are much more *equitable*, being based on those factors which are related to costs, and which are chosen to be applied by the policy maker.

Method

Geography -

Data were obtained from the Developmental Disability divisions of Nebraska, South Dakota, and Wyoming. These are three adjacent rural states located in the north central region of the United States, with general populations of 1,666,028, 733,133, and 479,602 (U.S. Bureau of the Census, 1999). Wyoming has the smallest population of all 50 states; but has the largest land area of the three states included. Its population density in people per square mile exceeds only Alaska. The largest city in the three states is Omaha, NE, with a population of 618,262, followed by Lincoln, NE with 213,641. South Dakota has Sioux Falls (123,809) and Rapid City (81,343); while the only Metropolitan area in Wyoming recognized by the Census Bureau is Cheyenne at 73,142 (U.S. Bureau of the Census, 1996). Of the total population of 2,878,763, 39% live in Census-designated "Metropolitan areas."

County unemployment rates for 1998 and Per-capita Income for 1997 were used in these analyses, and were assigned to each individual, based upon where the person lived and received services. Of the records used in the following model, Wyoming's mean unemployment rate (5.32%) was more than twice those of

Nebraska (2.63%) and South Dakota (2.68%) (Nebraska, South Dakota, and Wyoming Departments of Labor, 1999). Likewise, Wyoming's mean Per-Capita Income ($21,843) was less than South Dakota's ($22,447) and Nebraska's ($23,103) (U. S. Bureau of Economic Analysis, 1999). Of high importance in the current study is Wyoming's lawsuit *(Weston v. Wyoming State Training School, 1994)*. As will be seen later, this suit has had a major influence on Wyoming's costs and rates.

The three states ranked in the top sixteen nationally for per capita outlays using the Home and Community-Based Services Waiver (Smith & Gettings, 1998). Wyoming was 4th, South Dakota was 9th, and Nebraska was 16th. A similar pattern for the three states is suggested by Braddock, Hemp, Parish, & Rizzolo (2000) in their 1998 total fiscal effort ranking for the three states. Wyoming was 3rd, South Dakota was 15th, and Nebraska was 28th. This is all for the good outcome for, in the same study, the rankings for community placements per capita reflect South Dakota as 4th (244 per 100K), Wyoming as 7th (220 per 100K), and Nebraska (155 per 100K) as 18th. Prouty and Lakin (1999), in their annual compendium of residential utilization statistics, found that all three states had higher utilization rates for large public institutions than the national average of 19.0 people per every 100,000 of the general population. South Dakota was the highest of the three with 30.9, followed by Wyoming at 26.6 and Nebraska at 24.4. Nebraska ($217) and South Dakota ($195) were both reported as having lower per-diem expenditures than the national average of $285 per day; whereas Wyoming was substantially higher at $369. In terms of the proportions of their general populations living in group homes in the 1-6 bed range, all three states were similarly higher than the national average of 74.7 per 100,000 (NE 120.7, SD 158.7, and WY 148.0). On the other hand, although Wyoming (17.3) and Nebraska (18.9) both demonstrated utilization rates for large group homes (7-15 beds), South Dakota's rate was more than four times higher at 89.0 per 100,000 people, ranking that state second highest in the

nation. All three states exceed the national average utilization rate of 128.6 per 100,000 for using Medicaid (ICF/MR and HCBS) funding (NE 176.8, WY 193.6, and the 278,6 for SD ranked second). HCBS expenditures per citizen also exceeded the $26.34 national average in all three states: NE $40.38, SD $54.83, and WY $79.46. On the other hand, while Nebraska's per-recipient HCBS expenditure of $32,486 and Wyoming's $38,804 both exceeded the national figure of $30,782, South Dakota was below this mark at $26,308. In summary, all three states serve relatively high proportions of their populations in residential settings, both state institutions and group homes, but Wyoming's expenditures per recipient appear to be higher than its neighbors'. This is most likely attributable to its lawsuit.

All three states base their HCBS payment upon statistical relationships between agency costs and individual characteristics as measured by the ICAP. Each state has conducted research into these relationships, and relies upon the cost predicted by a multiple regression model of ICAP variables upon the cost measure. These predicted costs become the basis for each person's individualized reimbursement rate. Wyoming's DOORS system that uses individual resource allocation was reviewed by Smith in February of 1999 as a special studies initiative and its merits for empowering families and local teams with an individual budget amount were extensively analyzed and discussed.

Instruments and Data Collection -

The Inventory for Client and Agency Planning (ICAP) (Bruininks, Hill, Weatherman, & Woodcock, 1986) was used to collect data on individual characteristics, residential setting, and daytime programs during FY 1998. Data were also collected from each State's Developmental Disabilities (DD)agency relaying whether or not any type of residential service or support was being purchased on behalf of the given individual, as well as any type of daytime program of services/supports. These services/supports were also differentiated between "adult" and "child" services. If a state had separate

funding programs for adults and children, this was the basis for this distinction; otherwise, services for people 21 years of age and younger were considered children, 22 and older as adults. In no case was a service provided to anyone age 22 or older considered as a "child" service. Data on funding sources (ICF/MR, HCBS, or State-Funded) were also collected from the DD agencies, including the actual monthly reimbursement amounts paid for each person ("Rates") in June 1998. Provider-agency expenditures ("Costs") for each person were also collected.

For the three state institutions, the Costs were the "per resident daily expenditures" as reported by Prouty & Lakin (1999), Table 1.6. For the Wyoming State Training School (WSTS), the Rate was derived from the summary statistics on ICF/MR expenditures in Prouty & Lakin (1999), Table 3.4. South Dakota's ICF/MR rate was the mean of the four quarterly payment rates used by their Medicaid Management Information System. Nebraska's rate was based on the total direct and indirect costs for the Beatrice State Developmental Center (BSDC) divided by the number of 'patient days' for which services were provided.

South Dakota's Costs for HCBS and State-funded people were estimated by annualizing the results of time studies conducted by direct-care staff of community agencies over 7 "logging" weeks distributed through FY1998. Time spent with each individual was projected into annual hours of staff time in each of five service centers: 1) Service coordination, 2) Residential, 3) Segregated day, 4) Supported employment, and 5) Nursing. Total provider-agency expenditures in each of these centers were collected on Cost Reports. These total amounts were then divided by the total hours projected for that center, yielding a per-hourly cost. Multiplying each individual's annualized hours by that hourly cost, and adding a small amount of support and ancillary flat-rate costs, produced a solid estimate of the costs associated with providing services by each agency.

Wyoming's provider agencies were all paid the same annual rates, $6870 for residential services, and $8456 for daytime services. Costs were estimated by

multiplying each agency's average expenditure per "contract" person by 0.6 for residential only, by 0.40 for daytime program only, and by 1.0 for both. For HCBS participants, "Costs" are the dependent measures used in formulating those payment regression formulas. They are initially determined in a prewaiver study of 20 sample cases in which rates were set for adult DD Medicaid HCB waiver with later review of each case by waiver specialists. The Wyoming State Level of Care Committee also reviewed forced rates and extraordinary requests and exceptional cases. These reviews could involve a separate rate negotiation conducted for each individual.

All of Nebraska's Cost and Rate data were included in the Developmental Disabilities System database, with the exception of the BSDC costs. These were based on the historic levels of funding for the provider agencies distributed based upon where the person lived or worked. These funding levels were further modified based on team recommendations after review by Service Coordination.

Agency size is the total number of people served by the relevant provider agency. For Nebraska, where one person may receive services from several different provider agencies, the Service Coordination agency was selected to determine the Agency size value. Independence in the residential setting was calculated from the ICAP Residential Placement field (F1) utilizing a scale adapted from the one developed by Heal, Johnson, and Fujiura in 1983:

Residential Placement	ICAP F1	RESSCALE
Independent, own home	3	1.52
Independent, w. monitor	4	1.15
Parents, relatives	1	0.84
Semi-independent, w. staff	6	0.74
Foster care	2	0.52
Group residence	7	0.31
State institution	11	-0.55

Participants -

Participants were picked from an initial pool, assembled from databases maintained by the Developmental Disabilities agency in each state at the end of June, 1998 (n=6,508). South Dakota has 35 community ICF/MR beds (under 16 beds). Because this is the only state with comparable facilities, those records were dropped. Because one of our goals was to compare certain day and residential programs, records of those people in other programs were dropped. Individuals meeting the following specifications were dropped from the analysis:

- ICAP Daytime Program field G1=1 (No program) or G1=2 (" Volunteers") (n=26).
- The State DD agency reported a community residential service as being received; but the ICAP Residential Placement field indicated as follows (n=232):
  - F1=0 (data missing),
  - F1=5 (Room & board only),
  - F1=8 (Personal care facility, i.e. assisted living),
  - F1=9 (ICF Nursing Facility),
  - F1=10 (SNF Nursing Facility),
  - F1=11 (State Institution), or
  - F1=12 (Other).
- The State DD agency reported a community daytime program; but ICAP Daytime Program field G1=1 (No program), G1=2 (Volunteers), G1=3 (School), G1=4 (Day Care), or G1=11 (State institution) (n=79).
- State DD agency indicated State funding, or HCBS; but ICAP F1=11 (State Institution - all state institution residents are ICF/MR-funded.) (n=7).
- ICAP Daytime Program field G1=4 (Day Care - Nebraska was the only state using this.) (n=13).

- South Dakota State-funded people with no June, 1998 rates found (n=19).
- Wyoming people receiving respite care only (n=8).

This resulted in a database with 5,990 records, which is summarized in the frequency distribution presented in Table 1.

Insert Table 1 about here.

Table 1 presents four frequency distributions of the data used in this study. Note the "Age" table at the bottom. Only 68 children under the age of 6 were reported, with most of those being in Wyoming. Because of the small overall "n", and the very skew nature of this small distribution, the under-six age group was also dropped from further analyses; resulting in a final "n" of 5,996. South Dakota contributing 2,099, Wyoming 1,169, and 2,728 came from Nebraska. State institutions (ICF/MR), were the home for 770, 3,978 were funded by HCBS, and 730 with state general funds.

Data Analyses -

All the variables used in the analyses, and their simple statistics, are summarized in Table 2. Dependent variables include monthly cost (MONCOST), and its Log^{10} transformation (LOGCOST), monthly rates (MONRATE), and its Log10 transformation (LOGRATE), as well as the Residential Independence Scale (RESSCALE). Cost and Rate figures used in all analyses are the total Costs and Rates associated with purchasing Developmental Disabilities services for each person. They do not include Costs or payments for services paid by other sources such as the Medicaid State plan, HUD Residential subsidies, private health insurance, SSI contribution to board and room costs for the individuals, special education programs, EPSDT, and other supportive programs, etc.

Independent measures included three geographic measures: State involvement with a lawsuit (LAWSUIT) is a binary variable, 1 for Wyoming, 0 for Nebraska and South Dakota. County unemployment rates for 1998 (UNEMP98) were obtained from the web sites of each state's Department of Labor. County per-capita income figures for 1997 (PCI97) were found on the web site of the U.S. Bureau of the Census (1999). Binary measures are used to indicate if an individual received community day (DAYADUL) or residential (RESADUL) services/supports for adults, DAYKID and RESKID for children. HCBS and CTS are binary measures that indicate if a person's funding source is the state's HCBS waiver or state funding. The remainder of the independent variables is taken from the ICAP. The ICAP's residential (F1) and daytime measures (G1) were used to construct several binary "dummy" variables. Variable labels ending in "?" designate binary measures.

Insert Table 2 about here

All the independent measures in Table 2 were entered into a stepwise multiple regression with LOGCOST as the dependent variable, entry level $p<.50$, stay level $p<.01$. The UNEMP98 variable appeared to be confounded with the LAWSUIT variable, as Wyoming's unemployment numbers were much higher than the relatively low figures in Nebraska and South Dakota. The regression was then rerun minus the unemployment measure. The independent measures selected by the stepwise regression were then categorized into groups, generally organized from the least to most controllable: 1) Geographic measures, 2) ICAP individual characteristics, 3) ICAP residential measures, 4) ICAP supported employment, 5) Services/supports, and 6) State funding. These blocks of predictors were then entered into hierarchical regressions to determine their relative contributions to explaining variance in Costs, Rates, and the Residential Independence Scale. As it might be assumed that costs also would have an effect on rates, cost was added as a seventh block for RATES and RESSCALE.

Next, several analyses were conducted to examine differences between states, funding sources, residential types, supported employment vs. community facility-based day services, and agency size. Analyses of variance were conducted first, with State being one of the classification variables in all the two-way analyses. Secondly, analyses of covariance were conducted to determine if the findings of the ANOVAs might be results of the influence of the other predictor variables. Of course, those covariates that were derived from, or confounded with, the independent measures were not used. For example, LAWSUIT, CTS and INSTIT were not used as covariates in State x Funding comparisons. Only adults (over 21) in community programs were used in the supported employment vs. facility-based day program comparisons; and the economy-of-scale analysis excluded the institutions. The data were summarized using simple means in the analyses of variance, and least-squares means with the analyses of covariance. *Post hoc* tests were used to further make individual comparisons to interpret the significant main and interaction effects. Simple means were compared with Tukey's studentized range test, $\alpha=0.05$. Least-squares means were compared using the SAS PDIFF option to generate all possible probability values. If an interaction effect was significant, all within-row and within-column contrasts were tested using a $p<.05$ criterion.

Results

The order of entry of predictors into the stepwise regression can be seen in Table 3a. Note that State funding was the first measure entered, followed by state institutions, the two groups at the extreme ends of the cost spectrum. Next were Group residences. Then the four service/support measures were entered. Finally, Sheltered workshop was dropped because it barely exceeded the stay level of $p<.01$.

Insert Table 3a about here

The final model is summarized in Table 3b. The adjusted R^2 of 0.7469 indicates that the model explains 75% of all the variation in Monthly Costs. This is approximately the same level of prediction found when establishing the models used by Wyoming to generate individual payments. Note that the tolerance statistics all exceed .20, most of them by quite a margin. This indicates that the predictors are orthogonal, and no problems associated with multicollinearity would be expected.

Insert Table 3a about here

Figure 1 presents the scatter diagram of residuals from the model by the predicted values. The plot does not show the skewness that was found when a very similar model was obtained using the untransformed cost data. This contributed to our decision to use the Log^{10} transformation for constructing the model.

Insert Figure 1 about here

The hierarchical "blockwise" regressions are summarized in Table 4. The geographic measures have a small, but statistically significant, effect on both Costs and Rates. ICAP individual characteristics add 34% to the explanation of Cost variation, and 37% to Rates. Residence adds another 25% to Costs, and 22% to Rates. Sheltered employment adds only a minute amount, being non-significant for Costs. The Services/supports received add another 13% to the explanation of Costs, and 7% to Rates. State funding, on the other hand adds another 3% to the explanation of Rates; but a minute amount for Costs. Finally, Costs add a final 14% to the explanation of Rates.

Insert Table 4 about here

Analyses of variance and covariance are presented in Tables 5-10. Significant main and interaction effects suggested further analyses with *post hoc* tests. The data are summarized using simple means in the analyses of variance, and least-squares means with the analyses of covariance. The results of those individual comparisons are indicated by <, and >, symbols between adjacent cells to indicate significant ($p<.05$) differences. Superscript numbers (^{2}) denote differences between non-adjacent cells. Items, in the same column, and which did not differ significantly, are indicated by superscript letters (^{a}).

The analyses of variance and covariance comparing State x Funding are summarized in Table 5. The Funding main effect is the largest, with institutions being significantly higher in cost than HCBS, which costs more than State-funded services/supports. There were also differences between States, with Wyoming being higher than Nebraska, which in turn was significantly higher than South Dakota. The significant interaction effect can be seen within the State-funded group - only Nebraska and South Dakota differed, as revealed by *post hoc* tests, Wyoming not differing significantly from either. Adding the covariates did not change the main effects. However, other things being equal, South Dakota's State-funded costs were significantly lower than Wyoming's costs as well. Also the HCBS costs did not differ significantly from State-funded supports for either South Dakota or Nebraska.

Insert Table 5 about here

The similar analyses on Rates are presented in Table 6. The main effects are similar to those for Costs, with both ANOVA and analysis of covariance. However, in both analyses, Nebraska had the highest State-funded Rates, and South Dakota the lowest. This accounts for the significant interaction effect.

Insert Table 6 about here

Next, the States and Funding sources were compared using the Residential Independence Scale. Both analyses showed strong main effects for Funding. This is only natural, since ICFs/MR all have the lowest scale numbers, by definition. However, State-funded people also have higher independence scores than those with HCBS funding. State main effects for the ANOVA found South Dakota with independence levels higher than both Nebraska and Wyoming. Wyoming's HCBS independence scores were lower than the other two States, and Nebraska's State-funded scores were lower than the others.

Controlling for the influence of the covariates, the relative main effects were unchanged, as were the interaction effect, and *post hoc* comparison. Much of South Dakota's higher independence scores can be understood by examining Table 1. Note South Dakota's relatively higher proportion of people living in Semi-independent settings (Supervised apartments), as well as Independent-with monitor (Supported living).

Insert Table 7 about here

Monthly Costs associated with each residential setting are analyzed in Table 8. State main-effect differences are the same as in Table 5. As reported earlier, State institutions had the highest costs. Next highest wee Group residences, followed by Semi-independent settings, then Foster homes. The least expensive were Supported living, Families, and Independent, which did not differ substantially. There were no significant differences between States in Costs for people living independently; but Nebraska's Costs were less for people living with their families than the other two states. In Wyoming, Foster home Costs were higher than those for Supported living, which were higher than Costs for people living with Families, and Costs of those living

independently were the lowest. In the other two states, these four did not differ significantly.

Controlling for the influence of the covariates, the State main effect was not changed; and the Residence main effect was still highly significant. However, individual comparisons are somewhat different. Foster homes are not different from the less expensive settings; however, living with Family costs significantly less than all other settings. Wyoming's Foster home (Specialized Habilitation Families) costs are substantially higher than those of the other two states, and do no differ from the costs for Semi-independent settings in Wyoming.

Insert Table 8 about here

Costs to serve adults in community daytime settings are contrasted in Table 9. The State main effects are highly significant in both analyses, with Wyoming having the highest costs, and South Dakota the lowest. Both analyses also showed facility-based costs greater than those for people with supported employment. The interaction effect in the ANOVA is difficult to interpret. It can perhaps be attributed to Wyoming's relatively high facility-based costs. The analysis of covariance presents some interesting findings. Controlling for the influence of the covariates, Wyoming and Nebraska's supported employment costs do no differ significantly. All three states show different patterns when comparing costs of supported employment and facility-based daytime services: South Dakota's supported employment costs are higher; but Wyoming's are the lower; and Nebraska shows no significant difference between the two.

Insert Table 9 about here

Economy-of-scale analyses are shown in Table 10. Although the main effect of agency size was significant, it is difficult to detect a clear relationship,

although a tentative economy of scale might be seen, in that the 1-200 size group does have the highest costs. However, when controlling for the other variables, a definite **dis**economy of scale can be seen. The largest provider group has the significantly highest costs, and the smallest is less expensive than the two largest.

Insert Table 10 about here

Discussion

Geographic factors -

Per-capita income has a small but positive effect on costs. Provider agencies need to compete with other employers for staff; and higher local wages would require provider agencies to follow suit. The impact of Wyoming's lawsuit can be seen in the higher provider expenditures (Costs), and related reimbursement allocations (Rates), in the interstate comparisons. Wyoming's Monthly Costs are $1,000 higher than Nebraska's, and slightly more than that when compared to South Dakota. This finding corresponds to the numbers reported by Prouty and Lakin (1999). Although Wyoming's costs for State-funded supports do not differ from similar costs for either South Dakota or Wyoming, their HCBS costs are significantly higher. Furthermore, Wyoming's institutional costs are substantially higher than those in the other two states. One clear reason for this is Wyoming's higher staff to resident ratio that resulted from agreements made in settling the lawsuit. Braddock, et. al (2000) report that the 3.11 staff to resident institutional ratio in Wyoming is ranked 2nd in the nation that has an average of 2.09.

Individual characteristics and residence -

Individual characteristics play a major role in predicting both costs and rates. Note that the direction of each predictor is in the direction, which is

"intuitively correct." The more severe the disability - the higher the cost. As would be expected, institutions cost more than any other setting. *Costs include an increased and specialized physical plant and higher number of support personnel.* Group Homes are next highest, followed by Semi-independent settings. Supported living, Foster homes, and Independent settings are approximately equivalent. ("Independent" folks still are receiving *some* supports, otherwise they wouldn't be in this study.)

However, note that Wyoming's Foster-home costs are much higher than either SD or NE. Wyoming does concentrate much more intensive services in these "Special Family" services than the more typical Foster Care settings in SD or NE. This, in conjunction with Wyoming's relatively higher proportion of children served, and the effects of its lawsuit, most likely accounts for much of the higher costs/rates in Wyoming. Finally, people living with family members apparently do result in significant reductions in costs/rates. This latter finding lends support to the economic desirability of such family support programs as respite care.

Supported Employment -

The finding that Facility-based services are more expensive than Supported Employment comes as somewhat of a surprise. Other comparisons we have done, using nationwide data have indicated that increased utilization of supported employment results in higher overall costs to states. However, the present data also paint a contradictory picture: Controlling for the influence of the covariates, South Dakota's data parallel the national findings, with supported employment costs exceeding facility-based services; likewise Nebraska, although not significantly. However, Wyoming's facility-based costs are much higher than those for supported employment. Note that South Dakota also has a much larger proportion receiving supported employment than do the other two states. One might deduce that South Dakota's higher numbers in supported employment

would also include a much larger number of people with more severe disabilities, and hence greater associated costs.

Services/Supports -

Logically, adding residential and daytime services/supports increases costs. Comparable services/supports for children also cost more than those for adults. These four services/supports do not exhaust the menus of services available in each state. They were the four, which could be identified as common to all three states. All three states provide Service coordination for all of the people. Since everybody received it, there was no variation. Regarding all the other services/supports, Wyoming has the most extensive menu of available services.

Funding Source -

As discussed above, institutions cost more than community-based supports, even while controlling for individual differences and other covariates. Furthermore, HCBS services/supports cost significantly more than state-funded services. This is quite basic economics, best explained by Willy Sutton's "Because, that's where the money is."

Costs add much to the explanation of Rates. Note that "costs" and "rates" respond quite similarly to the same predictors. Costs are determined largely by how much money is available in the provider's budget to spend. Provider budgets depend largely upon the rates they are paid. It appears to us that these measures are so closely intertwined and highly correlated that attempting to distinguish between them is a largely futile academic exercise.

Residential Independence -

ICF/MR shows less independence than the other funding sources simply by definition. It can be assumed that HCBS funding results in less independence than state funding because states maximize their return on their state matching

money by concentrating HCBS funds for people in the more expensive settings, e.g. group homes. South Dakota's higher independence statistics can be attributed to its proportionately higher utilization of Semi-independent (staffed apartment buildings), as well as supported living.

These data were included to demonstrate the potential of making "Other Things Being Equal" (OTBE), comparisons on various outcome measures. We have compared states and funding sources on residential independence. Similarly, other outcome measures, such as consumer satisfaction ratings and Quality of Life measures can also be applied with these methods. By applying the predictor measures as covariates, states, funding sources, service-coordination agencies, service/support providers, etc. can be compared on these outcomes, OTBE.

Economy of Scale -

Economy of Scale is an elusive creature in this field. Although the simple main effects of the ANOVA show a rather tentative economy-of-scale function, the ANACOVA produces a quite definite **dis**economy of scale. OTBE, the larger the provider agency, in terms of the total number of people served/supported, the more expensive are those services/supports. This agrees substantially with the results of our previous work (Campbell & Heal, 1995). Our opinion is that this can be attributed to a number of administrative and support personnel, which tend to increase disproportionately as an agency grows.

Applications -

The regression model presented here could be used in the making of empirically based policy decisions. The information generated could provide an alternative to the sole reliance on intuition, anecdotal information, or political factors. For states or other funding agencies, the model presented here provides a very solid basis for assigning payment rates, which are *equitable:*

- By multiplying the parameter estimates from Table 3b by the predictor values for a given individual, summing the products, and reversing the Log^{10} transformation, a payment rate can be determined for each person.
- That rate is a function of the predictors in the model - geographic, individual characteristics, residential & daytime settings, residential and/or daytime services/supports, and funding source.
- If policy makers do not want to use a given predictor, the predictor mean for that variable can simply be substituted for the individual value. For example, if a state did not wish to pay less for state-funded people than those funded by HCBS, 0.2086707 would simply be substituted for the "1" or "0" for each individual.
- *Adjustment factors* could be applied to the results of the model, allowing a funding agency to control resource allocations:
  - Remain within budget, *and/or*
  - "Hold harmless" the fiscal impact to a given provider agency, and/or individual.

These methods would go a long way towards making payments more *equitable,* i.e. basing reimbursements upon the needs of the individual. This is a vital step in designing the financial architecture for individual service plan budgets. However, they are based upon the services/supports currently received, and the residential/daytime settings currently in effect. They do nothing towards determining the *appropriateness* of those services, supports or settings for an individual. We intend to address the development of aids to assist in making those judgements in future research. Neither, do these findings address the issue of the *quality* of services/supports. Emerson, et al. (2000) has presented an impressive piece of research, which takes these factors into account. Unfortunately, such data are hard to come by when relying upon ecological data as we are in the current effort. We also have not addressed the issue of *adequacy* of reimbursement amounts. Such efforts would

need to also address the issue of quality, as well as measures of the "fiscal health" of provider agencies. Interstate comparisons could also give some indication of the relative adequacy of funding. The importance of *data integrity* increases dramatically when reimbursement amounts are tied to data, which are furnished by service/support providers. This is summed up by the idea, "When you pay more for sicker people, people get sicker." The typical response of funding entities is to devote substantial resources to scrutinizing or auditing the data.

Some alternative ideas have been proposed to deal with such problems. *"Egalitarian"* or flat rate funding is a tempting concept: the idea has its pros and cons. It would be a natural incentive for provider agencies to do less for most people. Coincidentally, that is what many folks need or want. On the other hand, it is also an incentive for providers to select consumers who need only minimal supports. Some form of counter incentive would need to be developed to entice agencies to serve/support people with more extensive needs. We have now returned to a need for establishing *equitable* payment mechanisms.

Another approach might involve a form of *outcome funding,* which could be based on whether the desired settings, services, supports are in fact provided. The desired settings, services or supports could be determined by the following methods:

1. The settings, services and supports, recommended by interdisciplinary planning teams, could be considered the desired ones. Our experience over the years has been that such recommendations are generally several years ahead of the ability or willingness of provider agencies to meet those recommendations (Heinlein, et al. 1998).
2. Desired settings, services and supports could be determined by reference to those experienced by other people with similar characteristics.
    - Such comparisons could be made to a large database containing measures of individual characteristics, as well as the settings, services and

supports provided. Studies would need to be conducted to illuminate the relationships between these measures, and to develop the necessary guidelines. We intend to begin conducting such studies with the present database in the near future.

- Alternatively, comparisons can be made to national statistics on the utilization of settings, services or supports. The current scarcity of relevant national data limits this possibility.

In any event, reimbursement based on such outcomes would need to account for variation in individual characteristics to assure that funding allocations are made *equitably*. The methods outlined above still have utility in this regard.

There are methodological advantages to studies using balanced designs, and using data collected specifically by research teams for the purpose of a study. However the real world imposes severe limits, especially in the realm of sample sizes. By using extant databases, we are able to pare down our groups to meet the design, and still be able to produce some interesting analyses. Although we are not as well equipped to directly control error, having large numbers of participants seems to more than make up for this shortcoming. Our analyses of these data were able to produce a model, which explained a relatively large amount of variation, and to conduct some interesting analyses. Once such a database is established, the potential exists to answer many questions.

References

Bruininks, R., Hill, B., Weatherman, R., & Woodcock, R. (1986). Inventory for Client and Agency Planning. Chicago, IL: Riverside Publishing Company.

Braddock, D., Hemp, R., Parish, S., & Rizzolo, M. C. (2000). The state of the states in developmental disabilities: 2000 study summary. Department of Disability and Human Development, University of Illinois at Chicago.

Campbell, E. M., Fortune, J., & Heinlein, K. B. (1998). The effects of funding packages on the outcomes of integration and independence of adults with developmental disabilities in two rural states. Journal of Developmental and Physical Disabilities. 10(3), 257-281.

Campbell, E. M., & Heal, L. W. (1995). Prediction of cost, rates, and staffing by provider and client characteristics. American Journal on Mental Retardation. 100(1), 17-35.

Children's Hospital, Training and Research Institute for People. National Association for Retarded Citizens. (1976). Report on the task force on funding and standards for community residential services. Arlington, TX: NARC Research and Demonstration Institute.

Emerson, E., Robertson, J., Nicky, G., Hatton, C., Kessissoglou, S., Hallam, A., Knapp, M., Jarbrink, K., Noonan-Walsh, P., & Netten, A. (2000). Quality and Costs of Community-Based Residential Supports, Village Communities, and Residential Campuses in the United Kingdom. American Journal on Mental Retardation. 105(2), 81-102.

Fortune, M., Heinlein, K. B., & Fortune, B. (1995). Changing the shape of the service population. European Journal on Mental Disability. 2(8), 20-37.

Gettings, R.M. (1977). Hidden impediments to deinstitutionalization. State Government, 50, 214-219. (Council of State Governments, Lexington, KY.)

Heal, L. W., Johnson, L. J., & Fujiura, G. T. (1983). Variations in destructiveness. Superintendent Digest of the National Association of Superintendents of Public Residential Facilities for Mental Retardation. 2, 40-42.

Heal, L. W., Wieck, C. A., Bruininks, R. H., Lakin, K. C., & Hill, B. K. (1984). Predictors of domiciliary cost for public and community residential facilities in the USA. Paper presented at the Symposium on the Cost of Deinstitutionalization, Ottawa Canada.

Heal, L. W., Copher, J. I., Wieck, C. A., & Bruininks, R. H. (1989, May). Predictors of home residential facilities in the United States. Paper

presented at the 1989 convention of the American Association on Mental Retardation, Chicago.

Heinlein, K. B., Campbell, E. M., Fortune, J., Fortune, B., Moore, K. S., & Laird, E. (1998). Hitting the moving target of program choice. Research in Developmental Disabilities. 19(1), 27-38.

Hemp, R. (1992). Financing community services for persons with disabilities: State agency and community provider perspectives. Minneapolis: University of MN, Research and Training Center on Residential Services and Community Living.

Jones, P. A., Conroy, J. W., Feinstein, C. S., & Lemanowicz, J. A. (1994). A matched comparison of cost-effective: institutionalized and deinstitutionalized people. Journal of the Association for Persons with Severe Handicaps. 9, 303-313.

Knobbe, C. A., Carey, S. P., Rhodes, L., & Horner, R. H. (1995). Benefit-cost analysis of community versus institutional services for adults with severe mental retardation and challenging behaviors. American Journal on Mental Retardation. 99(5), 533-541.

President's Committee on Mental Retardation. (1976). Mental retardation: The known and the unknown. Washington, DC: Author.

Prouty, R., and Lakin, K. C. (1999). Residential services for persons with developmental disabilities. Minneapolis, Minnesota, Research and Training Center on Community Living.

Smith, G. A. (1999). Wyoming DOORS setting IRAs for HCB Waiver Services. Special Studies Initiative, Policy & Practice Brief. Alexandria, VA: National Association of State Directors of Developmental Disabilities, Inc.

Smith, G. A., & Gettings, R. M. (1998). The Medicaid home and community-based waiver program: Recent and emerging trends in serving people with developmental disabilities. Alexandria, VA: National Association of State Directors of Developmental Disabilities Services, Inc.

U.S. Bureau of the Census. (1996). Land area, population, and density for metropolitan areas: 1990, Table 2., April 14, 1996. [On-line], Available: http://www.census.gov/population/censusdata/90den_ma.txt

U.S. Bureau of the Census. (1999). State population estimates and demographic components of population. Report ST-99-2, December 29, 1999. [On-line], Available: http://www.census.gov/population/estimates/state'st-99-2.txt

U.S. Bureau of Economic Analysis. (1999). Personal income and per capita personal income by county, 1995-97. Survey of Current Business, May 1999, July 12, 1999. [On-line], Available:

http://www.bea.doc.gov/bea/regional/reis/scb/svy_ne.htm

http://www.bea.doc.gov/bea/regional/reis/scb/svy_sd.htm

http://www.bea.doc.gov/bea/regional/reis/scb/svy_wy.htm

Weston v. Wyoming State Training School, No C0-0004 (D. Wyo. 1994).

Table 1

Sources of Data Used in Study, Frequency Distributions.

	State			
	South Dakota	Wyoming	Nebraska	Total
Funding				
State Funding	322	196	730	1248
Medicaid HCBS Waiver	1520	846	1612	3978
Medicaid ICF/MR	257	127	386	770
Total	2099	1169	2728	5996
Current Day Program (ICAP, G1)				
No Formal Program (G1=1)	28	54	92	174
School (G1=3)	60	279	284	623
Day Activity Center (G1=5)	204	329	258	791
Work Activity Center (G1=6)	658	56	470	1184
Sheltered Workshop (G1=7)	289	113	799	1201
Supported Employment (G1=8)	586	181	347	1114
Competitive Employment (G1=9)	17	30	92	139
State Institution (F1=11)	257	127	386	770
Total	2099	1169	2728	5996
Current Residence (ICAP, F1)				
Parents or Relatives (F1=1)	194	372	718	1284
Foster Home (F1=2)	34	28	30	92
Independent, Own Home (F1=3)	27	74	90	191
Independent, w. Monitoring (F1=4)	594	115	439	1148
Semi-independent, w.Staff (F1=6)	290	60	95	445
Group Residence (F1=7)	703	393	970	2066
State Institution (F1=11)	257	127	386	770
Total	2099	1169	2728	5996
Age				
0-5	2	49	17	68
6-15	37	163	142	342
16-21	145	90	301	536
22-64	1798	812	2185	4795
65+	117	57	83	257
Total	2099	1169	2728	5996

Table 2
Simple Statistics for Variables Used in Analyses.

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
MONCOST	*Monthly Cost*	*5928*	*2918.13*	*2501.24*	*20.23*	*20525.63*
LOGCOST	*Log10 Monthly Cost*	*5928*	*3.29*	*0.43*	*1.31*	*4.31*
MONRATE	*Monthly Rate*	*5928*	*2821.14*	*2345.85*	*5.94*	*14964.75*
LOGRATE	*Log10 of Monthly Rates*	*5928*	*3.27*	*0.46*	*0.77*	*4.18*
RESSCALE	*Residential Independence Scale*	*5928*	*0.54*	*0.55*	*-0.55*	*1.52*
LAWSUIT	State Lawsuit Involvement?	5928	0.19	0.39	0.00	1.00
PCI97	1997 Per-Capita Income	5928	22632.79	3469.66	12972.00	42311.00
UNEMP98	1998 Unemployment Rate	5928	3.16	1.47	1.00	9.20
RESADUL	Adult Residential?	5928	0.63	0.48	0.00	1.00
RESKID	Child Residential?	5928	0.06	0.24	0.00	1.00
DAYADUL	Adult Daytime Services?	5928	0.67	0.47	0.00	1.00
DAYKID	Child Daytime Services?	5928	0.04	0.20	0.00	1.00
AGE	Age	5928	37.00	14.67	6.00	97.00
A7	Means of Expression	5928	3.01	1.00	0.00	6.00
BROADMO	ICAP Broad Independence Months	5928	71.05	53.84	-3.00	432.00
MALGEN	ICAP General Maladaptive Index	5928	-15.14	12.76	-66.00	4.00
AUTISM	Dx: Autism?	5928	0.04	0.20	0.00	1.00
BLIND	Dx: Blindness?	5928	0.04	0.20	0.00	1.00
BRAIN	Dx: Brain/Neurological Damage?	5928	0.07	0.25	0.00	1.00
CP	Dx: Cerebral Palsy?	5928	0.13	0.34	0.00	1.00
CHEM	Dx: Chemical Dependency?	5928	0.01	0.09	0.00	1.00
DEAF	Dx: Deafness?	5928	0.03	0.18	0.00	1.00
EPILEPSY	Dx: Epilepsy or Seizures?	5928	0.30	0.46	0.00	1.00
PHYSICAL	Dx: Physical Health Problem?	5928	0.24	0.43	0.00	1.00
PSYCHO	Dx: Mental Illness (Psychosis)?	5928	0.13	0.34	0.00	1.00
NEURO	Dx: Situational Mental Health?	5928	0.15	0.35	0.00	1.00
C1	Level of Mental Retardation	5928	2.96	1.25	1.00	5.00
C2	Vision Limitations	5928	1.21	0.52	1.00	3.00
C3	Hearing Limitations	5928	1.10	0.38	1.00	3.00
C4	Seizure Frequency	5928	1.31	0.77	1.00	4.00
C5	Health Limitations	5928	1.51	0.73	1.00	3.00
C6	Need for MD/RN Care	5928	1.43	0.92	1.00	5.00
C7_1	No Current Medication?	5928	0.00	0.00	0.00	0.00
C8	Arm/Hand	5928	1.30	0.61	1.00	3.00
C9	Mobility	5928	1.14	0.36	1.00	4.00
C10_1	No Mobility Assistance Needed?	5928	0.69	0.46	0.00	1.00
C10_2	Assistive Mobility Devices?	5928	0.19	0.39	0.00	1.00
C10_3	Occasional Mobility Assistance?	5928	0.14	0.34	0.00	1.00
C10_4	Always Needs Mobility Help?	5928	0.11	0.31	0.00	1.00
PARENT	Lives with Family?	5928	0.21	0.40	0.00	1.00
AFC	Lives in Foster Home?	5928	0.01	0.12	0.00	1.00
INDEP	Lives Independently?	5928	0.03	0.18	0.00	1.00
MONAPT	Independent w. Monitoring?	5928	0.19	0.40	0.00	1.00
SPVAPT	Semi-Independent Unit w. Staff?	5928	0.08	0.26	0.00	1.00
CRF	Group Residence?	5928	0.35	0.48	0.00	1.00
INSTIT	State Institution?	5928	0.13	0.34	0.00	1.00
DAC	Day Activity Center?	5928	0.18	0.39	0.00	1.00
WAC	Work Activity Center?	5928	0.24	0.43	0.00	1.00
SHOP	Sheltered Workshop?	5928	0.21	0.41	0.00	1.00
SUPT	Supported Employment?	5928	0.17	0.38	0.00	1.00
COMP	Competitive Employment?	5928	0.04	0.20	0.00	1.00
HCBS	Medicaid HCBS Funding?	5928	0.66	0.47	0.00	1.00
CTS	State Funding?	5928	0.21	0.41	0.00	1.00

Dependent variables are shown in Italics. Independent variables selected are in bold.

Table 3a
Summary of Stepwise Procedure for Log[10] of Monthly Costs

Step	Variable Entered	Removed	Number In	Partial R**2	Model R**2	C(p)		Prob>F
	Label							
1	CTS		1	0.2457	0.2457	11790.746	1930.7692	0.0001
	State Funding?							
2	INSTIT		2	0.1640	0.4097	7941.7579	1645.8097	0.0001
	State Institution?							
3	CRF		3	0.1512	0.5609	4392.9457	2039.6706	0.0001
	Group Residence?							
4	RESADUL		4	0.0417	0.6026	3414.6795	622.1275	0.0001
	Adult Residential?							
5	RESKID		5	0.0284	0.6310	2749.6563	455.8352	0.0001
	Child Residential?							
6	DAYADUL		6	0.0246	0.6557	2173.0332	423.6445	0.0001
	Adult Daytime Services?							
7	DAYKID		7	0.0308	0.6865	1451.1763	581.9816	0.0001
	Child Daytime Services?							
8	LAWSUIT		8	0.0189	0.7054	1009.5748	379.4564	0.0001
	State Lawsuit Involvement?							
9	BROADMO		9	0.0142	0.7195	679.1169	298.6869	0.0001
	ICAP Broad Independence Months							
10	SPVAPT		10	0.0101	0.7296	444.1143	220.8377	0.0001
	Semi-Independent Unit w. Staff?							
11	C10_4		11	0.0038	0.7334	356.6747	84.5156	0.0001
	Always Needs Mobility Help?							
12	MALGEN		12	0.0039	0.7373	266.8997	87.9977	0.0001
	ICAP General Maladaptive Index							
13	SUPT		13	0.0026	0.7399	208.9986	57.9891	0.0001
	Supported Employment?							
14	C10_1		14	0.0012	0.7411	183.2106	27.0194	0.0001
	No Mobility Assistance Needed?							
15	PARENT		15	0.0010	0.7421	161.5847	23.0580	0.0001
	Lives with Family?							
16	AGE		16	0.0013	0.7434	132.5949	30.3954	0.0001
	Age in Years							
17	C1		17	0.0010	0.7444	111.7807	22.4579	0.0001
	Level of Mental Retardation							
18	PSYCHO		18	0.0011	0.7455	88.1051	25.3788	0.0001
	Dx: Mental Illness (Psychosis)?							
19	PCI97		19	0.0007	0.7462	73.4290	16.5266	0.0001
	1997 Per-Capita Income							
20	BRAIN		20	0.0007	0.7469	58.7689	16.5542	0.0001
	Dx: Brain/Neurological Damage?							
21	AUTISM		21	0.0006	0.7474	47.5867	13.1254	0.0003
	Dx: Autism?							
22	C8		22	0.0004	0.7478	40.1116	9.4477	0.0021
	Arm/Hand Limitations							
23	SHOP		23	0.0003	0.7481	35.4824	6.6163	0.0101
	Sheltered Workshop?							
24		SHOP	22	0.0003	0.7478	40.1116	6.6163	0.0101
		Sheltered Workshop?						

Note: Stepwise selection, entry level $p<.50$, stay level $p<.01$.

Table 3b
Stepwise Regression on Log[10] Monthly Costs - Subjects over 5 Years Old.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	22	823.17654	37.41712	796.072	0.0001
Error	5905	277.54787	0.04700		
C Total	5927	1100.72441			

Root MSE	0.21680	R-square	0.7478
Dep Mean	3.28952	Adj R-sq	0.7469
C.V.	6.59063		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|	Tolerance	Variable Label
INTERCEP	1	2.524441	0.03252698	77.611	0.0001	.	Intercept
Geographic Data							
LAWSUIT	1	0.148343	0.00780109	19.016	0.0001	0.85022277	State Lawsuit Experience?
PCI97	1	0.000003509	0.00000084	4.167	0.0001	0.92918655	1997 Per-capita Income
AGE	1	-0.001197	0.00023951	-4.998	0.0001	0.64205921	Age in Years
ICAP: Individual Characteristics							
BROADMO	1	-0.000428	0.00008578	-4.992	0.0001	0.37183405	ICAP Broad Independence Months
MALGEN	1	-0.001878	0.00026181	-7.173	0.0001	0.71079836	ICAP General Maladaptive Index
AUTISM	1	0.054501	0.01434854	3.798	0.0001	0.91834857	Dx: Autism?
BRAIN	1	0.044506	0.01150415	3.869	0.0001	0.94772076	Dx: Brain/Neurological Damage?
PSYCHO	1	0.043991	0.00882696	4.984	0.0001	0.87819315	Dx: Mental Illness (Psycohosis)?
C1	1	0.019392	0.00333010	5.823	0.0001	0.45870079	Level of Mental Retardation
C8	1	0.019559	0.00636337	3.074	0.0021	0.53130905	Arm/Hand Limitations
C10_1	1	-0.037452	0.00821173	-4.561	0.0001	0.54672778	No Mobility Assistance Needed?
C10_4	1	0.062802	0.01202413	5.223	0.0001	0.55354692	Always Needs Mobility Assist.?
ICAP: Residential Setting							
PARENT	1	-0.067838	0.01099967	-6.167	0.0001	0.40068880	Lives with Family?
SPVAPT	1	0.154681	0.01222575	12.652	0.0001	0.76400631	Semi-independent Apartment?
CRF	1	0.211926	0.00928811	22.817	0.0001	0.40478957	Group Residence?
INSTIT	1	1.119229	0.01672750	66.910	0.0001	0.25099908	State Institution?
ICAP: Daytime Program							
SUPT	1	-0.067498	0.00857615	-7.870	0.0001	0.76446749	Supported Employment?
Services / Supports							
RESADUL	1	0.286758	0.01114314	25.734	0.0001	0.27431970	Adult Residential?
RESKID	1	0.383913	0.01522084	25.223	0.0001	0.59382758	Child Residential?
DAYADUL	1	0.327003	0.01044017	31.322	0.0001	0.32709803	Adult Day Program?
DAYKID	1	0.496999	0.01620990	30.660	0.0001	0.73301490	Child Day Program?
Funding							
CTS	1	-0.097911	0.00850349	-11.514	0.0001	0.66404412	State Funding?

Note: Stepwise selection, entry level $p<.50$, stay level $p<.01$.

Figure 1
Distribution of Residuals and Predicted Values from Regression Model.

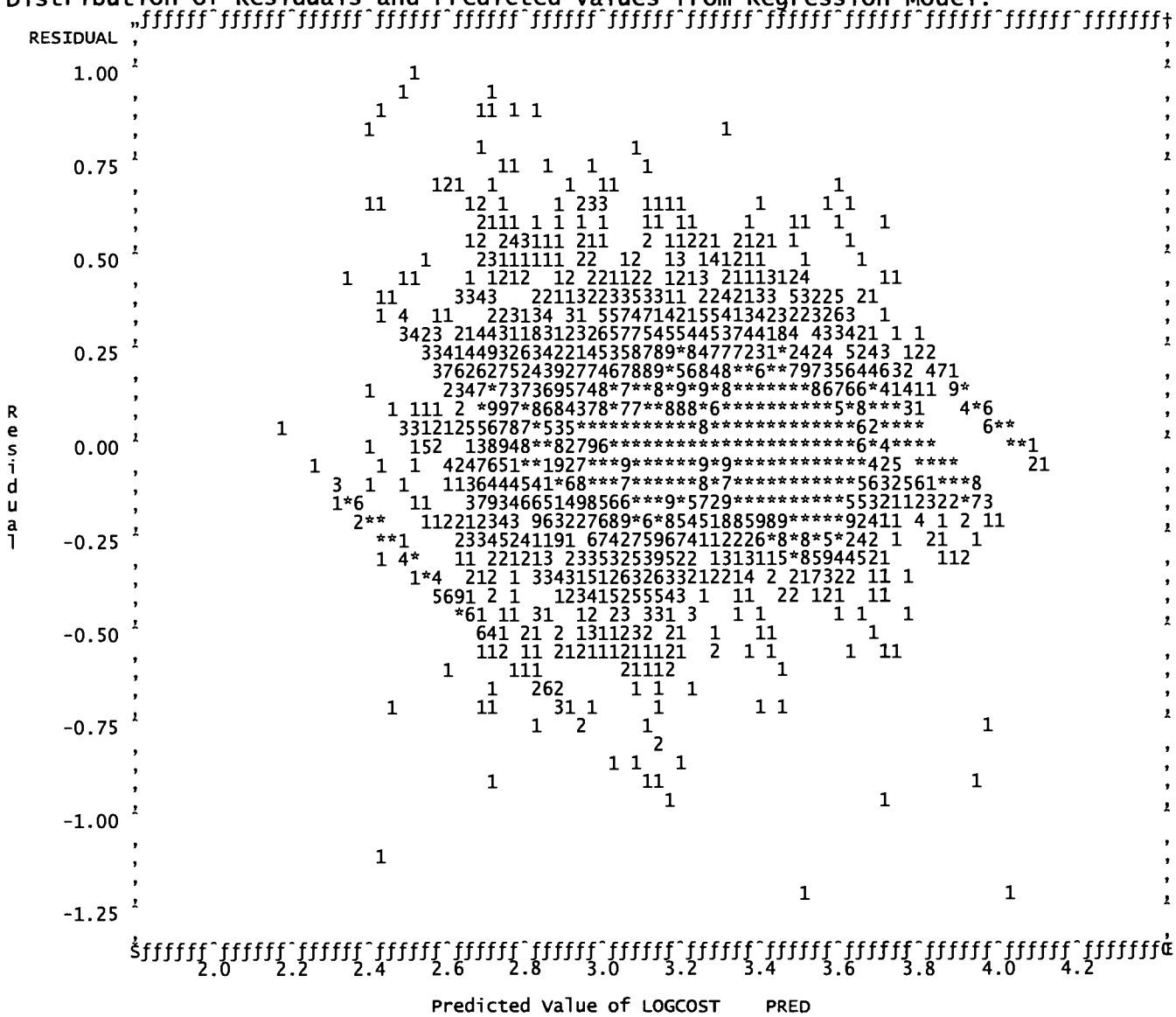

Table 4
Blockwise Hierarchical Regressions of Independent Measures on Costs, Rates and Residential Independence Scale.

	Adjusted R^2		
Independent Measure Blocks	Log^{10} Costs	Log^{10} Rates	Residential Independence
Geographic Measures	*0.0136	*0.0182	0.0011
ICAP Individual Characteristics	*0.3587	*0.3857	*0.4040
ICAP Current Residence (F1)	*0.6130	*0.6111	n.a.
ICAP Supported Employment	0.6131	*0.6133	*0.4157
Services / Supports	*0.7413	*0.6948	*0.5064
State Funding?	*0.7469	*0.7209	*0.5450
Log^{10} Costs		*0.8600	*0.7228

Notes: N=5,928. * Adjusted R^2 for the block is significantly higher than that for the previous block at the $p<.01$ level.

Table 5
Comparison of States and Funding Sources on Monthly Costs.

Dependent Variable: Monthly Costs

Analysis of Variance: Error DF=5927 R^2=0.5707

Type III Source	DF	F Value	Pr > F
Funding	2	3526.12	0.0001
State	2	352.23	0.0001
Funding x State	4	172.87	0.0001

Means

Funding	South Dakota		Wyoming		Nebraska	Funding Means
ICF/MR	$ 5,934[2]	<	$ 11,222	>	$ 6,600[2]	$ 7,141
HCBS	$ 2,418[2]	<	$ 3,296	>	$ 2,595[2]	$ 2,669
State $	$ 912[2]	=	$ 982	=	$ 1,186[2]	$ 1,082
State Means	$ 2,618[2]	<	$ 3,790	>	$ 2,790[2]	$ 2,918

Analysis of Covariance[1]*:* Error DF=5900 R^2=.7524

Type III Source	DF	F Value	Pr > F
Funding	2	2496.67	0.0001
State	2	631.89	0.0001
Funding x State	4	258.97	0.0001

Least Squares Means

Funding	South Dakota		Wyoming		Nebraska	Funding Means
ICF/MR	$ 6,911[2]	<	$ 12,181	>	$ 7,587[2]	$ 8,893
HCBS	$ 1,754[2a]	<	$ 2,936	>	$ 2,233[2a]	$ 2,308
State $	$ 1,699[a]	<	$ 2,026	=	$ 2,114[a]	$ 1,946
State Means	$ 3,455[2]	<	$ 5,714	>	$ 3,978[2]	

[1] Covariates are all the independent measures in Table 3b, except LAWSUIT, CTS and INSTIT.
[2] Nebraska and South Dakota differ at the $p<.05$ level.
[a] Values with the same letter do not differ at the p<.05 level from other values with the same letter in the same column.

Table 6
Comparison of States and Funding Sources on Monthly Rates.

Dependent Variable: Monthly Rates

Analysis of Variance: Error DF=5927 R^2=0.6012

Type III Source	DF	F Value	Pr > F
Funding	2	4036.27	0.0001
State	2	342.47	0.0001
Funding x State	4	153.70	0.0001

Means

Funding	South Dakota		Wyoming		Nebraska	Funding Means
ICF/MR	$ 5,981[2]	<	$ 10,381	>	$ 6,330[2]	$ 6,882
HCBS	$ 2,342[2]	<	$ 3,186	>	$ 2,603[2]	$ 2,620
State $	$ 473[2]	<	$ 875	<	$ 1,154[2]	$ 933
State Means	$ 2,501[2]	<	$ 3,598	>	$ 2,748[2]	$ 2,821

Analysis of Covariance[1]*:* Error DF=5900 R^2=0.7894

Type III Source	DF	F Value	Pr > F
Funding	2	2849.51	0.0001
State	2	660.99	0.0001
Funding x State	4	251.98	0.0001

Least Squares Means

Funding	South Dakota		Wyoming		Nebraska	Funding Means
ICF/MR	$ 6,686[2]	<	$ 11,003	>	$ 6,997[2]	$ 8,229
HCBS	$ 1,755[2]	<	$ 2,871	>	$ 2,304[2]	$ 2,310
State $	$ 1,254[2]	<	$ 1,881	<	$ 2,069[2]	$ 1,735
State Means	$ 3,232[2]	<	$ 5,251	>	$ 3,790[2]	

[1] Covariates are all the independent measures in Table 3b, except LAWSUIT, CTS and INSTIT.
[2] Nebraska and South Dakota differ at the $p<.05$ level.

Table 7
Comparison of States and Funding Sources on Residential Independence for Adults (Age>21).

Dependent Variable: Residential Independence Scale

Analysis of Variance: Error DF=5051 R^2=0.6842

Type III Source	DF	F Value	Pr > F
Funding	2	4534.59	0.0001
State	2	18.12	0.0001
Funding x State	4	14.63	0.0001

Means

Funding	South Dakota		Wyoming		Nebraska	Funding Means
ICF/MR	-0.55	=	-0.55	=	-0.55	-0.55
HCBS	0.66[2]	>	0.53	<	0.60[2]	0.61
State $	1.09[2]	=	1.07	>	0.93[2]	1.01
State Means	0.59[2]	>	0.50	=	0.49[2]	

Analysis of Covariance[1]: Error DF=5030 R^2=0.7699

Type III Source	DF	F Value	Pr > F
Funding	2	1919.19	0.0001
State	2	10.92	0.0001
Funding x State	4	4.65	0.0010

Least Squares Means

Funding	South Dakota		Wyoming		Nebraska	Funding Means
ICF/MR	-0.50	=	-0.50	=	-0.50	-0.50
HCBS	0.71[2]	>	0.62	=	0.64[2]	0.66
State $	0.85[2]	=	0.85	>	0.77[2]	0.83
State Means	0.35[2]	>	0.32	=	0.30[2]	

[1] Covariates are all the independent measures in Table 3b, except LAWSUIT, CTS, RESADUL, RESKID, PARENT, SPVAPT, CRF, and INSTIT.
[2] Nebraska and South Dakota differ at the $p<.05$ level.

Table 8
Comparison of Residence by State on Monthly Costs.

Dependent Variable: Monthly Costs

Analysis of Variance: Error DF=5927 R^2=0.6922

Type III Source	DF	F Value	Pr > F
Residence	6	1814.93	0.0001
State	6	228.34	0.0001
Funding x Residence	12	80.22	0.0001

Means

Residence	South Dakota		Wyoming		Nebraska	Reside. Means
Independent	$ 674[a]	=	$ 807	=	$ 819[a]	$ 794[a]
Family	$ 1,263[2ab]	=	$ 1,279	>	$ 1,006[2a]	$ 1,120[ab]
Sup't.Lvg.	$ 1,193[2ab]	<	$ 2,318	>	$ 1,438[2b]	$ 1,340[b]
Foster Home	$ 1,613[b]	<	$ 3,953	>	$ 1,085[ab]	$ 2,071
Semi-Indep.	$ 2,434	<	$ 2,975	>	$ 2,151	$ 2,447
Group Home	$ 3,178[2]	<	$ 4,584	>	$ 3,479[2]	$ 3,587
State Inst.	$ 5,934[2]	<	$11,222	>	$ 6,660[2]	$ 7,141
State Means	$ 2,618[2]	<	$ 3,790	>	$ 2,790[2]	$ 2,918

Analysis of Covariance[1]*:* Error DF=5892 R^2=0.7495

Type III Source	DF	F Value	Pr > F
Residence	6	1018.46	0.0001
State	6	214.71	0.0001
Residence x State	12	94.26	0.0001

Least Squares Means

Residence	South Dakota		Wyoming		Nebraska	Reside. Means
Independent	$ 1,574[ac]	=	$ 1,765	=	$ 1,796[a]	$ 1,712[a]
Family	$ 1,232[a]	=	$ 1,343	>	$ 1,102[a]	$ 1,226
Sup't.Lvg.	$ 1,751[2bc]	<	$ 2,601[a]	>	$ 2,043[2]	$ 2,132[a]
Foster Home	$ 1,329[ab]	<	$ 3,377[b]	>	$ 1,304[a]	$ 2,003[a]
Semi-Indep.	$ 2,452[d]	<	$ 2,904[ab]	>	$ 2,441	$ 2,600
Group Home	$ 2,500[2d]	<	$ 4,105	>	$ 3,244[2]	$ 3,283
State Inst.	$ 5,912[2]	<	$11,193	>	$ 6,591[2]	$ 7,899
State Means	$ 2,393[2]	<	$ 3,898	>	$ 2,646[2]	

[1] Covariates are all the independent measures in Table 3b, except LAWSUIT, RESADUL, RESKID, PARENT, SPVAPT, CRF, and INSTIT.
[2] Nebraska and South Dakota differ at the $p<.05$ level.
[abcd] Values with the same letter do not differ at the p<.05 level from other values with the same letter in the same column.

Table 9
Comparison of States and Community Adult (Age>21) Daytime Settings on Monthly Costs.

Dependent Variable: Monthly Costs

Frequency Distribution

Daytime	South Dakota	Wyoming	Nebraska	Daytime
Supported	580	209	393	1,182
Facility	1,078	495	1,421	2,994
State	1,658	704	1,814	4,176

Analysis of Variance: Error DF=4175 R^2=0.1855

Type III Source	DF	F Value	Pr > F
Daytime	1	646.44	0.0001
State	2	78.99	0.0001
Daytime x State	2	32.82	0.0001

Means

Daytime	South Dakota	Wyoming	Nebraska	Daytime Means
Supported	$ 1,352	< $ 1,665	> $ 1,240	$ 1,370
Facility	$ 2,476	< $ 4,129	> $ 2,585	$ 2,801
State Means	$ 2,083[2]	< $ 3,397	> $ 2,294[2]	

Analysis of Covariance[1]*:* Error DF=4153 R^2=0.5131

Type III Source	DF	F Value	Pr > F
Daytime	1	21.45	0.0001
State	2	104.90	0.0001
Daytime x State	2	34.76	0.0001

Least Squares Means

Daytime	South Dakota	Wyoming	Nebraska	Daytime Means
Supported	$ 2,116[2]	< $ 2,533	= $2,354[2a]	$ 2,334
Facility	$ 1,909[2]	< $ 3,428	> $ 2,512[2a]	$ 2,612
State Means	$ 2,013[2]	< $ 2,980	> $ 2,433[2]	

[1] Covariates are all the independent measures in Table 3b, except LAWSUIT, DAYKID, RESKID, DAYADUL and SUPT.
[2] Nebraska and South Dakota differ at the $p<.05$ level.
[a] Values with the same letter do not differ at the p<.05 level from other values with the same letter in the same column.

Table 10
Comparison of Community Provider Agency Size Groups on Monthly Costs.

Dependent Variable: Monthly Costs

Analysis of Variance:		Error DF=5155	R^2=0.0047
Type III Source		F Value	Pr > F
Agency Size	DF=3	8.12	0.0001

Means

Agency Size	
1-200	$ 2,360 [a]
201-400	$ 2,268 [a]
401-600	$ 1,970 [b]
601+	$ 2,230[ab]

Analysis of Covariance[1]:		Error DF=5134	R^2=0.5100
Type III Source		F Value	Pr > F
Agency Size	DF=3	15.46	0.0001

Least Squares Means

Agency Size	
1-200	$ 2,197[a]
201-400	$ 2,253[ab]
401-600	$ 2,421[b]
601+	$ 2,680

[1] Covariates are all the independent measures in Table 3b, except INSTIT.
[ab] Values with the same letter do not differ at the p<.05 level from other values with the same letter in the same column.

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