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Abstract

We analyze the incentive effects of organizational forms using data from Florida's Non-Emergency Medicaid Transportation (NEMT) programs. These programs differ in the extent to which their brokers are directly involved in providing transit services. Based on a simple model of moral hazard, we predict that the number of users and the number of claims per user of the program increase, but cost per claim of the program decreases, as its broker's share of transit services increases. The empirical evidence supports our theoretical predictions on the incentive effects of different organizational forms.

1. Introduction

The optimal design of incentive contracts and the optimal structuring of organizations are of central interest to economists. Although the theoretical literature offers many interesting predictions, the empirical literature provides few tests of these predictions due to a lack of appropriate data. This paper provides an empirical test of the incentive effects of organizational forms, using data from Florida's Non-Emergency Medicaid Transportation (NEMT) programs.

The Social Security Act and accompanying regulations require that state Medicaid programs provide Medicaid beneficiaries access to non-emergency transportation to and from medical appointments. Florida's NEMT programs contract with separate entities, commonly referred to as brokers, to control the costs, quality, and utilization of services. These programs differ in the extent to which their brokers are directly involved in providing transit services, referred to as their organizational forms.

We analyze the incentive effects of organizational forms on brokers' performance with a simple model of moral hazard. We show that, given the compensation structure, a broker supplies more effort on both quality assurance and cost reduction but less effort on screening trip eligibility as its share of transit services increases. Consequently, the number of Medicaid beneficiaries using services and the number of claims per user increase as the broker's share of transit services increases. Moreover, for a given number of claims, cost per claim decreases as the broker's share of transit services increases.

We test our theoretical propositions using cost and utilization data of Florida's NEMT programs in all sixty-seven Florida counties from fiscal year 1991 to 2002. We estimate the incentive effects using a two-step procedure to control for the endogeneity of the choice of organizational forms. The empirical evidence supports our theoretical propositions and is robust to empirical specifications. Our findings suggest that the choice of organizational form has important incentive effects on performance.

Our study provides an empirical test of contract theory. There exists a small but growing body of evidence supporting the existence of incentive effects in organizations. Lazear (2000) and Paarsch and Shearer (1999, 2000) consider the impact of piece rates on the performance of workers. Banker, Lee, and Potter (1996) study the effect of piece rates on sales in retail department stores. McMillan, Whalley, and Zhu (1989) and Grove *et al.* (1994) study how the changes of compensation practice in Chinese economic reforms have affected performance levels. Fernie and Metcalf (1999) consider the effect of compensation systems on the performance of British jockeys. Laffont and Matoussi (1995) study the relationship between production and the tenant's share of the product in a sharecropping contract. These studies find considerable effects of compensation on performance. Our study complements their findings by demonstrating the incentive effects of organizational forms on performance under a given compensation system.

The rest of the paper is organized as follows. Section 2 introduces Florida's NEMT programs. Section 3 develops a simple model of moral hazard to analyze the incentive effects of different organizational forms on a broker's effort decision, and derives empirical implications of the model. Section 4 describes our data and econometric method. Section 5 presents the estimation results of our econometric analysis. Section 6 summarizes the results and discusses some of the restrictions and generalizations of our study.

2. Florida's NEMT Program

The Social Security Act and accompanying regulations require that state Medicaid programs provide Medicaid beneficiaries access to non-emergency transportation to and from medical appointments. Most states meet the requirement by reimbursing recipients for transporting themselves or by enrolling transportation providers and paying them a fee for service.

However, the traditional, decentralized, fee-for-service approach to managing non-emergency Medicaid transportation has not been very effective in controlling costs, or fraud and abuse, or in assuring universal access to medical care. The Health Care Financing Administration estimated that NEMT costs increased ten percent annually nationwide between 1990 and 1995. In some individual states, NEMT costs increased much more rapidly, e.g., in Louisiana in the four years from 1990 to 1994 NEMT costs more than tripled, and in Georgia from 1993 to 1994 costs more than tripled in just one year.

In recent years, many states, including the state of Florida, have begun searching for more effective approaches to manage non-emergency transportation. An increasingly popular way is contracting with separate entities, commonly referred to as brokers, who serve as "gatekeepers" to control the costs and utilization of service and to assure quality of service and access to care. This approach to managing Medicaid transportation is known as the brokerage model.

By statute, Florida established a statewide Transportation Disadvantaged (TD) program which supports services for those who cannot provide their own transportation due to age, physical or mental infirmity or financial limitation. The TD program includes all transportation programs in Florida that are supported by federal, state, or local funding. Florida's NEMT program has participated in the TD program since FY 1996.

The TD Commission selects a local Community Transportation Coordinator (CTC) for each county. CTCs accept calls and authorize non-emergency transportation for Medicaid beneficiaries, determine if the beneficiary has access to transportation other than Medicaid–financed transport, verify beneficiary eligibility for Medicaid, determine that the transportation is for receiving a Medicaid-covered service, and select the most reasonable and cost effective mode of transport based on the beneficiary's physical and mental condition. They must also select the least costly transportation carrier, arrange transportation with the appropriate carrier, monitor the use of transportation by Medicaid beneficiaries, and assess problems related to trip cancellations and no-shows, misuse of transportation, and abusive behavior.

In each county, the Local Coordinating Board (LCB) monitors the CTC in determining how effectively local needs are being met. Furthermore, the LCB selects the CTC via a competitive bid process based on its evaluation of each broker's corporate experience, performance, references, resources, qualifications and costs. The CTC is required to either contract with outside transit service providers or provide some or all of the transportation itself. Table 1 shows the three different organizational forms used by CTCs that differ in the extent the CTCs are directly involved with providing transit services. CTCs are normally paid a fixed fee per trip and transit providers are normally paid a fixed fee, which varies with transportation modes, plus mileage.

Table 1
Taxonomy of Organizational Forms

Coordinator Type	Characteristics
Brokerage Only	Provides only brokerage service
Partially Integrated	Provides brokerage service and some transit services
Fully Integrated	Sole source of all brokerage and transit services

3. Theory and Implications

In this section, we analyze the incentive effects of different organizational forms with a simple model of moral hazard. We then derive the implications of the incentive effects on the cost and utilization of NEMT programs.

3.1. The demand for NEMT services.

A Medicaid beneficiary's demand function for eligible rides is $j(x,q)$, where x is a parameter affecting the beneficiary's valuation of eligible rides and q is the broker's effort in quality assurance. The parameter x is distributed between x_0 and x_1 with distribution function $F(x)$. For any given amount of rides, a beneficiary's marginal valuation of eligible rides increases as x increases.

On the other hand, a beneficiary's demand function for ineligible rides is $i(y,q,s)$, where y is a parameter affecting the beneficiary's valuation of ineligible rides and s is the broker's effort in screening user and trip eligibility.[1] The parameter y is

[1] It is in the broker's best interest to verify a user's Medicaid eligibility, as the state will later verify the rider's Medicaid eligibility and will reimburse a trip only if the rider's

distributed between y_0 and y_1 with distribution function $L(y)$. For any given amount of rides, a beneficiary's marginal valuation of ineligible rides increases as *y* increases.

The demands for both eligible and ineligible rides are increasing in both the beneficiary's valuation and the broker's quality-assurance effort, i.e., $j_x(x,q) > 0$, $j_q(x,q) > 0$, $i_y(y,q,s) > 0$, and $i_q(y,q,s) > 0$. Furthermore, the demand for ineligible rides is decreasing in the broker's screening effort, i.e., $i_s(x,q,s) < 0$.

Beneficiaries who place little value on NEMT services have no demand for rides. We define $x*$ and $y*$ as the values of x and y such that a user with an evaluation less than $x*$ and $y*$ has zero demand for eligible and ineligible rides, respectively. Formally, $j(x*,q) \equiv 0$ and $i(y*,q,s) \equiv 0$. It can be readily shown that both $x*$ and $y*$ decrease in the broker's quality-assurance effort but $y*$ increases in the broker's screening effort. It suggests that the number of beneficiaries using the services increases in the broker's quality-assurance effort but decreases in the broker's screening effort.

For the overall beneficiary population, the demands for eligible and ineligible rides are $J = \int_{x*}^{x_1} j(x,q)dF(x)$ and $I = \int_{y*}^{y_1} i(y,q,s)dL(y)$, respectively. Therefore, the overall demand for rides is $D(q,s) = \int_{x*}^{x_1} j(x,q)dF(x) + \int_{y*}^{y_1} i(y,q,s)dL(y)$.

Note that

Medicaid eligibility is confirmed by the state. Therefore, we focus our analysis on the demand of Medicaid beneficiaries only.

$$\frac{\partial D(q,s)}{\partial q} = \int_{x^*}^{x_1} j_q(x,q)dF(x) - j(x,q)f(x)\frac{dx^*}{dq}$$
$$+\int_{y^*}^{y_1} i_q(y,q,s)dL(y) - i(y,q,s)l(y)\frac{dy^*}{dq} > 0, \; and \tag{1}$$

$$\frac{\partial D(q,s)}{\partial s} = \int_{y^*}^{y_1} i_s(y,q,s)dL(y) - i(y,q,s)l(y)\frac{dy^*}{ds} < 0, \tag{2}$$

where $f(x)$ and $l(y)$ are the probability density functions for x and y respectively. Therefore, the demand for rides increases as the broker's quality-assurance effort increases, but decreases as the broker's screening effort increases.

Lemma 1 summarizes the above properties regarding the demand for NEMT services.

Lemma 1. A given user's demand for the services, the number of beneficiaries using the services, and therefore the total demand for services, all increase in the broker's quality-assurance effort but decrease in its screening effort.

3.2. The broker's problem.

Each broker in the NEMT program is offered a contract $\{r, b, t\}$, which specifies the broker's share of transit services, *r*, the brokerage fee, *b*, that the broker receives for each claim[2], and the transit fee, *t*, that the transit service provider receives for each claim. The amount of ineligible claims detected by the state administration, $\alpha(I)$, is increasing in the actual number of ineligible claims, *I*, i.e., $\alpha'(I) > 0$. For each ineligible claim detected by the state administration, the broker incurs a loss of *m*.

[2] A claim is a one-way ride per beneficiary.

The total cost of brokerage services is $H(D, e_b)$, where e_b is the broker's effort in reducing brokerage cost. The brokerage cost is increasing in the number of claims and decreasing in the broker's cost-reduction effort at a decreasing rate, i.e., $H_D(D, e_b) > 0$, $H_e(D, e_b) < 0$, $H_{DD}(D, e_b) < 0$, and $H_{ee}(D, e_b) > 0$.

The total transit cost is $G(D, e_t)$, where e_t is the broker's effort in reducing transit cost. As the number of claims increases, a broker can transport more beneficiaries with one vehicle or better organize claims to reduce the number of trips. Therefore, the total transit cost is increasing in the number of claims at a decreasing rate, i.e., $G_D(D, e_t) > 0$ and $G_{DD}(D, e_t) < 0$. Furthermore, the total transit cost is decreasing in the broker's cost-reduction effort at a decreasing rate, i.e., $G_e(D, e_t) < 0$ and $G_{ee}(D, e_t) > 0$. The broker's share of transit cost is $rG(D, e_t)$, as r is the broker's share of transit services.

The broker's cost of effort is $C(E)$, where $E \equiv s + q + e_b + e_t$. The cost of effort is increasing in effort at an increasing rate, thus, $C'(E) > 0$ and $C''(E) > 0$.

The State cannot observe the broker's effort supply, and therefore cannot specify the broker's effort supply in the service contract. Consequently, a moral hazard problem arises as the broker will allocate its efforts to maximize its expected profit. The broker's optimization problem is determining $\{q, s, e_b, e_t\}$ to maximize

$$\Pi = (b + rt)D - [H(D, e_b) + rG(D, e_t)] - C(E) - \alpha(I)m\,. \qquad (3)$$

Denote the broker's maximum profit under a given contract as $\Pi *$. The broker will participate in the contract only if $\Pi* \geq 0$, i.e., its maximum profit under the contract is nonnegative.

The first-order conditions of the broker's optimization problem are given by

$$\frac{\partial \Pi}{\partial q} = D_q(q,s)[(b+rt) - H_D(D,e_b) - rG_D(D,e_t)] - C'(E) - \alpha'(I)I_q(q,s)m = 0; \qquad (4)$$

$$\frac{\partial \Pi}{\partial s} = I_s(q,s)[(b+rt) - H_D(D,e_b) - rG_D(D,e_t) - \alpha'(I)m] - C'(E) = 0; \qquad (5)$$

$$\frac{\partial \Pi}{\partial e_b} = -H_e(D,e_b) - C'(E) = 0; \text{ and} \qquad (6)$$

$$\frac{\partial \Pi}{\partial e_t} = -rG_e(D,e_t) - C'(E) = 0. \qquad (7)$$

Equations (4)-(7) determine the broker's effort allocation among quality assurance, eligibility screening, and cost reduction.

From equation (4) and by the use of the Envelope theorem,

$$\frac{dq}{dr} = -\frac{\dfrac{\partial^2 \Pi}{\partial q \partial r}}{\dfrac{\partial^2 \Pi}{\partial q^2}} = \frac{D_q(q,s)[G_D(D,e_t) - t]}{\dfrac{\partial^2 \Pi}{\partial q^2}} \;. \qquad (8)$$

The second-order condition of the optimization problem requires $\frac{\partial^2 \Pi}{\partial q^2} \leq 0$.[3] Further, since $G_{DD}(D,e_t) < 0$, $t > G_D(D,e_t)$ must be true for transit service providers to cover their costs. Therefore, $\frac{dq}{dr} > 0$, i.e., the broker's quality-assurance effort increases as its share of transit services increases.

From equation (5) and by the use of the Envelope theorem,

[3] We assume that the second-order conditions for the broker's optimization problem are satisfied.

$$\frac{ds}{dr} = \frac{I_s(q,s)[G_D(D,e_t) - t]}{\frac{\partial^2 \Pi}{\partial s^2}} \le 0, \tag{9}$$

as the second-order condition of the optimization problem requires $\frac{\partial^2 \Pi}{\partial s^2} \le 0$. Therefore, the broker's screening effort decreases as its share of transit services increases.

Then, from Lemma 1, a given user's demand for the services, the number of beneficiaries using the services, and the total demand for services must increase as the broker's share of transit services increases.

We present these findings regarding the demands for NEMT services in Proposition 1.

Proposition 1. A given user's demand for services, the number of beneficiaries using the services, and the total demand for services increase as the broker's share of transit services increases.

Furthermore, from equations (6) and (7),

$$\frac{de_b}{dr} = 0\text{; and} \tag{10}$$

$$\frac{de_t}{dr} = -\frac{G_e(D,e_t)}{G_{ee}(D,e_t) + C''(E)} > 0. \tag{11}$$

The above equations suggest that increasing the broker's share of transit services raises the broker's effort in reducing transit costs, but has no effect on the broker's effort in reducing brokerage cost.

Denote AC as the total cost per claim, i.e., $AC \equiv (H(D,e_b) + G(D,e_t))/D$. The broker's share of transit services affects total cost per claim in two ways. Firs, it affects the demand for services; second, it affects the broker's cost-reduction effort.

Holding the number of rides constant, the second effect of the broker's share of transit services is

$$\frac{dAC}{dr} = \frac{G_e}{D}\frac{de_t}{dr} < 0,$$

i.e., total cost per claim is decreasing in the broker's share of transit services for any given number of rides.

The overall effect of the broker's share of transit services is

$$\frac{dAC}{dr} = \frac{(DH_D - H)D_r + (DG_D - G)D_r}{D^2} + \frac{G_e}{D}\frac{de_t}{dr}. \tag{12}$$

Since $H_{DD}(D,e_b) < 0$ and $G_{DD}(r,D,e_t) < 0$, $DH_D < H$ and $DG_D < G$. Therefore, $dAC/dr < 0$, i.e., total cost per claim decreases as the broker's share of transit services increases. Notice that the first term on the right-hand side of equation (12) is the effect of the broker's share of transit services on total cost per claim through the demand for services.

We present the above findings regarding the costs of NEMT services in proposition 2.

Proposition 2. As the broker's share of transit services increases, 1) total cost per claim for any given number of claims decreases; 2) total cost per claim of the NEMT program overall also decreases.

We next use data from Florida' NEMT programs to test our theoretical propositions regarding the incentive effects of organizational forms.

4. Data and Methods

4.1. Variables and data source

We obtained the cost and utilization data of the Florida's NEMT programs from the Florida Medicaid Management Information System maintained by Florida's Agency for Health Care Administration. The data include the total cost, number of users, number of claims, number of beneficiaries, and organizational forms of the NEMT programs in all sixty-seven counties in Florida from fiscal year 1991 to 2002.

Table 2 presents definitions of all variables used in the empirical analysis, with dependent variables in the upper panel, and explanatory variables in the lower panel. Table 3 presents descriptive statistics for all variables. Table 4 presents the number of counties adopting different organizational forms between fiscal year 1996 and 2002.

4.2. Econometric Method

4.2.1. Performance functions

We use a fixed effect panel data framework to examine the effects of organizational forms on the performance of the NEMT programs. The fixed effect specification captures differences across programs that are time-invariant and differences over time that are common to all programs.

The relationships between organizational forms and the cost and utilization of the program are estimated using the following equation:

$$\ln X^{i}_{tk} = \alpha^{i}_{1} + \sum_{N=2}^{67} \alpha^{i}_{N} \times N\_CTY_{k} + \alpha^{i}_{68} FI_{tk} + \alpha^{i}_{69} PI_{tk} + \alpha^{i}_{70} BO_{tk} + \alpha^{i}_{71} FY_{t}$$
$$+ \alpha^{i}_{72} \ln CI_{tk} + \alpha^{i}_{73} \ln DOC_{tk} + \alpha^{i}_{74} \ln REVN_{t} + \alpha^{i}_{75} \ln BEN_{tk} + \varepsilon^{i}_{tk}. \qquad (13)$$

where t is an index of fiscal years and k is a county index ($k = 1, 2, \ldots, 67$). X^{i}_{tk} represents the dependent variable i for county k in year t. The dependent variable is UPB (user per beneficiary) when $i = 1$, CPU (claims per user) when $i = 2$, and CPC (cost per claim) when $i = 3$. The symbol *ln* represents the natural logarithm. For example, $\ln X^{3}_{tk}$ represents the natural logarithm of cost per claim for the k^{th} county in the t^{th} fiscal year.

As we have shown in our analysis, both the number of claims and the broker's cost-reduction effort affect total cost per claim. To pinpoint the effect of organizational form on the broker's cost-reduction effort, we also use the following equation to estimate the relationship between total cost per claim and organizational forms controlling the number of claims:

$$\ln \mathrm{CPC}_{tk} = \alpha^{4}_{1} + \sum_{N=2}^{67} \alpha^{4}_{N} \times N\_CTY_{k} + \alpha^{4}_{68} FI_{tk} + \alpha^{4}_{69} PI_{tk} + \alpha^{4}_{70} BO_{tk} + \alpha^{4}_{71} FY_{t} + \alpha^{4}_{72} \ln CI_{tk}$$
$$+ \alpha^{4}_{73} \ln DOC_{tk} + \alpha^{4}_{74} \ln REVN_{t} + \alpha^{4}_{75} \ln BEN_{tk} + \alpha^{4}_{76} \ln CLAIM_{tk} + \varepsilon^{4}_{tk}. \qquad (14)$$

The explanatory variables of primary interest in all the above equations are the dummy variables FI, PI, and BO. FI is a dummy variable for the Fully Integrated model, PI for the Partially Integrated model, and BO for the Brokerage Only model. The performance under the previous fee-for-service approach is the basis of comparison. Therefore, the coefficients of the dummy variables FI, PI, and BO capture the effect of organizational forms on performance in comparison with the fee-for-service approach. By doing so, we fully utilize the data from fiscal year 1991 to 1995, when the NEMT program was under the fee-for-service model, to better control for time-invariant county-specific factors and the trend of NEMT services.

CI is a price index of transportation services for each county. The price of transportation services in a county may not only affect the CTC's provision of transit services, but also influence beneficiaries' usage of NEMT services. For example, a higher price for transportation services could drive more beneficiaries to use NEMT services and at the same time compel CTCs to try to reduce usage of the system. DOC is the number of doctors of medicine or osteopathy per square mile in each county. More doctors in a specific area could lead to, on average, a shorter trip per claim (and also reduce the number of the more expensive out-of-county trips) and less usage of NEMT services by beneficiaries. REVN is the state's per capita revenue in each fiscal year which captures the state's budget situation. The variable is important since the state's fiscal health could influence pressures on AHCA or CTCs to control costs. FY captures changes in conditions related to the provision of NEMT services over the years. N_CTY measures county-specific characteristics affecting the provision of NEMT services for each county. ClAIM is the number of claims of the NEMT program. The α^i terms are the coefficients to be estimated, and ε^i_{kt} is a random error that has a zero mean and a standard deviation equal to σ^i.

4.2.2. The Choice of Organizational Form

It is possible that the choice of organizational form is endogenous. First, CTCs may determine the organizational form of NEMT programs based on some county characteristics and broker characteristics. Second, the organizational form may have a selection effect on brokers. For example, brokers who chose to participate in a Fully Integrated model may be more efficient in transit services than those who chose to participate in a Brokerage Only model. If ε_{kt}^{i} includes any of those county or broker characteristics that correlate with the choice of organizational form, the estimates of performance functions are biased.

To account for the endogeneity of the choice of organizational form, we estimate the performance equations using a two-step procedure—an instrumental variables method.

First, we estimate the choice of organizational form as a function of demographic and political characteristics of a county, using a multinomial logit model:

$$FORM = f(BEN, CI, LAND, POP, POVERTY, SHMIN, PARTY, GASPR), \quad (15)$$

where FORM is the organizational form of the program. FORM equals 1 for Fully Integrated, 2 for Partially Integrated, and 3 for Brokerage Only. LAND is the land area of each county; POP is the population of each county. Since there are more large-size transportation firms operating in more densely populated markets, the population and land area of a county could be correlated with the size and efficiency of transportation providers. POVERTY is the share of population living in poverty. SHMIN is the share of minority population. Since a large percentage of small transportation firms are owned by minorities, a larger presence of minority makes it more difficult for CTC to award all services to one large firm. PARTY is the absolute value of the share of Democrats among registered voters in each county minus 0.5. It measures the extent to which the county is controlled by one political party. It might be more difficult for the CTC to grant all services to one provider if either political party has control of the county. GASPR is gasoline sales per resident in each county, which reflects transportation conditions in the county.

Second, we obtain the predicted values of FI, PI, and BO based on the estimated choice functions. Third, we estimate the performance equations using the predicted value of FI, PI, and BO as the instruments for these variables.

Finally, we also estimate equations (13) and (14) directly by the method of ordinary least-squares. The estimation results from the two different methods are compared as a check for the robustness of the results.

5. Estimation Results

5.1. The choice of organizational form

Table 5 presents the estimates of the choice function with the Partially Integrated model as the comparison group. Consistent with our conjectures, compared with the Partially Integrated model, the Fully Integrated model is more likely to arise in counties with a smaller percentage of minority population or a higher population density, or more dominated by one political party. On the other hand, the Brokerage Only model is more likely to arise in counties with a larger percentage of minority population or a lower population density, or less dominated by one political party. Moreover, both the Fully Integrated model and the Brokerage Only model are less likely to arise in counties with more gasoline sales per resident.

5.2. The effect of organizational form.

Tables 6 to 9 present the estimates of the performance functions using the two-step procedure. To focus on the effect of organizational forms on performance, we do not report the estimates for the county dummy variables.

Table 6 presents the regression results for the effect of organizational form on the number of users per beneficiary. The coefficients of FI and PI are 0.1 and 0.03, which indicates that the proportion of beneficiaries using NEMT services increased by 10 percent in Fully Integrated programs and 3 percent in Partially Integrated programs, although the increase in Partially Integrated programs is not statistically significant. The coefficient for BO is -0.28, suggesting that the proportion of beneficiaries using NEMT services decreased by 24 percent in Brokerage Only programs.

Table 7 presents the regression results for the effect of organizational form on the number of claims per user. The coefficients of FI and PI are positive and highly significant, meaning that claims per user have increased under these two organizational structures in a statistically significant way. The results indicate that, on average, claims per user have risen by 9 percent under the Partially Integrated model and 15 percent under the Fully Integrated model. The coefficient of BO is insignificant both economically and statistically, suggesting that claims per user under the Brokerage Only model is not significantly different from those under the previous fee-for-service model.

The above regression results suggest that the number of users and the number of claims per user of a NEMT program increase as the broker’s share of transit services increases, as predicted by Proposition 1.

Table 8 presents the regression results for the overall effect of organizational form on cost per claim (Equation (13)). The coefficients of FI and PI are negative and highly significant statistically, meaning that NEMT programs with these organizational forms have reduced total cost per claim in a statistically significant way. The results indicate that, on average, Fully Integrated programs have reduced cost per claim by 38%, and Partially Integrated programs have reduced cost per claim by 25%. On the other hand, Brokerage Only programs do not show significant changes in cost per claim.

Table 9 presents the regression results for equation (14) which focuses on the effect of the organizational form on the broker's effort-reduction effort. The coefficients of FI and PI are -0.44 and -0.27 respectively, and both are highly significant statistically. The results suggest that, holding the number of claims constant, Fully Integrated programs have reduced cost per claim by 36%, and Partially Integrated programs have reduced cost per claim by 24%. In contrast, Brokerage Only programs do not show significant changes in cost per claim even after controlling the number of claims. It is noteworthy that the coefficient for lnCLAIM is -0.16 and statistically significant, suggesting economies of scale for NEMT services.

The results in Tables 8 and 9 suggest that total cost per claim for a given number of claims and total cost per claim for a NEMT program overall decrease as the broker's share of transit services increases, as predicted by Proposition 2. Moreover, a comparison between the results in Tables 8 and 9 suggests that more than 90 percent of the overall reduction in total cost per claim for a NEMT program is caused by the increased cost-reduction effort under the brokerage models.

As a check for the robustness of the above results, we also estimate equations (13) and (14) by the method of ordinary least-squares. Tables 10 to 13 present estimates of the performance functions using ordinary least-squares estimation. These estimates demonstrate the same effects of organizational structures on program performance as the instrumental variables, although the magnitudes of the effects are smaller. Thus the empirical support for our theoretical propositions on the incentive effects of organizational forms is robust to the exact empirical specification.

6. Conclusion

The theoretical literature on incentive contracts has been well developed. However, the empirical validation of the theory has long lagged behind the theoretical work. In this paper, we provide an empirical test of the incentive effects of organizational forms, using data from Florida's Non-Emergency Medicaid Transportation (NEMT) programs.

We analyze the incentive effects of different organizational forms of Florida's NEMT program with a simple model of moral hazard. The theoretical propositions are tested using the cost and utilization data of Florida's Non-Emergency Transportation programs. We estimate the incentive effects using both a direct ordinary least-squares method and a two-step procedure to control for the endogeneity of the choice of organizational form. The empirical evidence supports our theoretical propositions and is robust to empirical specifications.

Our study suggests that the choice of organizational forms has important incentive effects on performance. It contributes to a small but growing body of evidence supporting the existence of incentive effect in organizations.

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Table 2. Regression Variables

Variable	Definition
UPB_{tk}	Users per beneficiary
CPU_{tk}	Claims per user
CPC_{tk}	Inflation-discounted average cost per claim
$FORM_{tk}$	The organizational form of the NEMT program of each county in each fiscal year defined as 1 for Fully Integrated, 2 for Partially Integrated, and 3 for Brokerage Only.
FFS_{tk}	A dummy variable defined as 1 if the NEMT program is under previous fee-for-service delivery model, and 0 otherwise
BO_{tk}	A dummy variable defined as 1 if CTC is Brokerage Only type, and 0 otherwise
PI_{tk}	A dummy variable defined as 1 if CTC is Partially Integrated type, and 0 otherwise
FI_{tk}	A dummy variable defined as 1 if CTC is Sole Source type, and 0 otherwise
$CLAIM_{tk}$	Number of claims in each county in each fiscal year
FY_{t}	Fiscal year
BEN_{tk}	Number of beneficiaries in each county in each fiscal year
DOC_{tk}	Number of doctors of medicine or osteopathy per square mile in each county in each fiscal year
POP_{tk}	Population of each county in each fiscal year
$LAND_{k}$	Land area of each county
CI_{tk}	The transportation price index for each county in each fiscal year
$REVN_{t}$	The state's per capita revenue in each fiscal year
$POVERTY_{tk}$	Share of population in poverty in each county in each fiscal year
$SHMIN_{tk}$	Share of minority population in each county in each fiscal year
$PARTY_{tk}$	The absolute value of share of democrats among registered voters minus .5 in each county in each fiscal year
$GASPR_{tk}$	Gas sales per resident in each county in each fiscal year
N_CTY_{k}	Sixty six dummy variables that equal 1 for county N=*k*, and 0 for all other counties, where N = *2,…, 67*

Table 3. Summary Statistics for Key Variables

Variable	Mean	Std. Dev.	Min	Max
COST	55.20	63.36	9.22	807.00
UPB	0.10	0.04	0.03	0.30
CPU	12.61	6.06	3.88	86.00
CPC	41.74	18.41	10.35	146.42
CLAIM	30445	57467	85	676027
BEN	27201	55173	78	495045
DOC	0.59	1.24	0.00	9.39
CI	98.06	2.27	88.98	107.92
LAND	805	385	240	2025
POP	221874	369693	5659	2318845
REVN	2462.67	178.00	2065.89	2644.15
POVERTY	15.52	4.87	0.07	0.29
SHMIN	0.17	0.10	0.02	0.61
PARTY	0.18	.12	.00	.46
GASPR	503.84	108.82	274.30	797.70

Table 4. Number of Counties Adopting Different Organizational Forms

Fiscal Year	Complete Brokerage	Partial Brokerage	Sole Source
1996	10	45	12
1997	9	45	13
1998	9	45	13
1999	9	44	14
2000	12	41	14
2001	12	41	14
2002	12	41	14

Table 5. Regression Results for CTCs' Selection of Organizational Form

	Coefficient	Std. Err.	z	P>|z|
		Fully Integrated		
BEN	0.000	0.000	6.500	0.000
CI	0.153	0.081	1.890	0.059
LAND	0.002	0.001	3.330	0.001
POVERTY	-0.351	0.060	-5.870	0.000
GASPR	-0.009	0.001	-6.170	0.000
SHMIN	-3.666	2.112	-1.740	0.083
PARTY	1.943	1.701	1.140	0.253
POP	0.000	0.000	-7.050	0.000
CONSTANT	-5.264	7.880	-0.670	0.504
		Brokerage Only		
BEN	0.000	0.000	-1.970	0.049
CI	0.224	0.088	2.560	0.011
LAND	0.000	0.000	-0.700	0.481
POVERTY	0.107	0.041	2.640	0.008
GASPR	-0.008	0.002	-4.570	0.000
SHMIN	3.251	1.586	2.050	0.040
PARTY	-10.903	1.893	-5.760	0.000
POP	0.000	0.000	0.200	0.841
CONSTANT	-19.485	8.405	-2.320	0.020
Pseudo R^2				0.292

*The Partially Integrated model is used as the comparison group.

Table 6. Two-Step Procedure Estimates of Equation (13)
(Users per Beneficiary)

	Coefficient	Std. Err.	z	P>|z|
FI	0.099	0.058	1.710	0.087
PI	0.032	0.035	0.900	0.370
BO	-0.284	0.083	-3.430	0.001
ln CI	1.284	0.461	2.780	0.006
ln BEN	-0.183	0.069	-2.650	0.008
ln REVN	1.446	0.241	6.000	0.000
ln DOC	-0.187	0.040	-4.620	0.000
FY	-0.066	0.005	-12.240	0.000
R^2				0.780

Table 7. Two-Step Procedure Estimates of Equation (13)
(Claims per User)

	Coefficient	Std. Err.	z	P>|z|
FI	0.143	0.064	2.220	0.027
PI	0.086	0.039	2.180	0.030
BO	0.007	0.093	0.080	0.938
ln CI	-0.609	0.514	-1.180	0.237
ln BEN	-0.355	0.077	-4.590	0.000
ln REVN	0.730	0.269	2.710	0.007
ln DOC	-0.021	0.045	-0.470	0.642
FY	0.040	0.006	6.580	0.000
R^2				0.665

Table 8. Two-Step Procedure Estimates of Equation (13)
(Cost per Claim)

	Coefficient	Std. Err.	z	P>|z|
FI	-0.486	0.063	-7.770	0.000
PI	-0.292	0.038	-7.610	0.000
BO	-0.003	0.090	-0.030	0.978
ln CI	1.515	0.500	3.030	0.003
ln BEN	0.111	0.075	1.480	0.140
ln REVN	-0.540	0.261	-2.070	0.039
ln DOC	-0.023	0.044	-0.520	0.606
FY	0.022	0.006	3.840	0.000
R^2				0.724

Table 9. Two-Step Procedure Estimates of Equation (14)
(Cost per Claim)

	Coefficient	Std. Err.	z	P>|z|
FI	-0.447	0.062	-7.250	0.000
PI	-0.273	0.038	-7.230	0.000
BO	-0.047	0.088	-0.540	0.593
ln CI	1.625	0.490	3.310	0.001
ln BEN	0.186	0.075	2.480	0.013
ln REVN	-0.188	0.264	-0.710	0.477
ln DOC	-0.056	0.043	-1.300	0.195
FY	0.018	0.006	3.140	0.002
ln CLAIM	-0.162	0.029	-5.590	0.000
R^2				0.735

Table 10. Least-Squares Estimates of Equation (13)
(Users per Beneficiary)

	Coefficient	Std. Err.	z	P>|z|
FI	0.076	0.041	1.820	0.069
PI	-0.027	0.030	-0.910	0.365
BO	-0.086	0.043	-2.020	0.044
ln CI	1.116	0.443	2.520	0.012
ln BEN	-0.173	0.070	-2.470	0.014
ln REVN	1.365	0.242	5.630	0.000
ln DOC	-0.187	0.040	-4.630	0.000
FY	-0.063	0.005	-11.850	0.000
R^2				0.779

Table 11. Least-Squares Estimates of Equation (13)
(Claims per User)

	Coefficient	Std. Err.	z	P>|z|
FI	0.116	0.046	2.520	0.012
PI	0.073	0.033	2.210	0.027
BO	0.056	0.048	1.190	0.236
ln CI	-0.598	0.494	-1.210	0.226
ln BEN	-0.351	0.078	-4.500	0.000
ln REVN	0.699	0.270	2.590	0.010
ln DOC	-0.023	0.045	-0.520	0.603
FY	0.041	0.006	6.920	0.000
R^2				0.665

Table 12. Least-Squares Estimates of Equation (13) (Cost per Claim)

	Coefficient	Std. Err.	z	P>|z|
FI	-0.377	0.045	-8.430	0.000
PI	-0.260	0.032	-8.080	0.000
BO	-0.116	0.046	-2.520	0.012
ln CI	1.4637	0.479	3.060	0.002
ln BEN	0.110	0.076	1.450	0.146
ln REVN	-0.453	0.262	-1.730	0.084
ln DOC	-0.018	0.044	-0.420	0.673
FY	0.0167	0.006	2.910	0.004
R^2				0.725

Table 13. Least-Squares Estimates of Equation (14) (Cost per Claim)

	Coefficient	Std. Err.	z	P>|z|
FI	-0.346	0.044	-7.830	0.000
PI	-0.252	0.032	-8.000	0.000
BO	-0.121	0.045	-2.680	0.008
ln CI	1.548	0.469	3.300	0.001
ln BEN	0.187	0.075	2.490	0.013
ln REVN	-0.118	0.263	-0.450	0.654
ln DOC	-0.053	0.043	-1.220	0.224
FY	0.013	0.006	2.310	0.021
ln CLAIM	-0.162	0.029	-5.630	0.000
R^2				0.736