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ECONOMIES OF SCALE IN ADMINISTRATIVE EXPENSES

Substantial economies of scale exist in administrative functions...

Inside the **Black Box of Administrative Costs**, Kenneth E. Thorpe, *Health Affairs*, Summer 1992.

Summary

Conventional wisdom holds that economies of scale exist in health plan administration. Economies of scale have been both as a reason for business combinations, and as a justification for a single-payor, nationalized health insurance system.

Our annual study of administrative expenses in Blue Cross Blue Shield Plans supports this. According to our analysis, administrative expenses representing 21.1% of the total were subject to economies of scale. For these expenses, a 100% increase in size would be expected to lead to a 73.9% increase in costs on a PMPM basis.

Thus, if a health plan has an administrative expense ratio of 12.0%, doubling its size could lead to a 0.7 percentage point reduction in that ratio. If the scalar effect dropped to the bottom line, based on a 2% operating profit margin, profits could increase by approximately 33%.

In this study, we identify several functional areas where economies of scale are statistically significant, as shown in Figure 1. With the exceptions of Internet/eCommerce and Miscellaneous Business Taxes, the costs in these areas are largely comprised of professional type services. The identification of economies of scale has implications for health plans considering outsourcing, consolidation of regional operations, or acceleration of growth strategies.

Interestingly, Provider Relations Services demonstrated a statistically significant *diseconomy* of scale. In other words, larger health plans tended to

devote greater resources towards services to providers, such as call center and call center support, than their smaller peers. This result is consistent with that observed in 2003.

This analysis demonstrated results that were comparable to those of a similar study that we performed last year, except that there were some changes in which scalable functional areas demonstrated statistical significance and, in some cases, some of the measures of significance were stronger. The source of the information in this analysis is data used in the *2004 Sherlock Expense Evaluation Report, Blue Cross Blue Shield Edition*.

Background

This analysis considers whether economies of scale exist in the administration of health plans. Economies of scale describe the tendency for average costs of products to fall as volume increases. For years, the managed care industry has enjoyed commercial economies of scale that have stemmed from strengthened bargaining power with individual providers. The resulting health care cost advantage powered the remarkable growth of health plans in the '80s and '90s. However, the consolidation of hospitals, the increasingly open panels of physicians and the dominance of the plans that pioneered the managed care strategy has made this competitive advantage obsolete.

Consequently, firms have sought other sources of economies of scale, which have generally aimed to leverage the semi-variable costs of administration. While some functional areas may be resistant to economies of scale, such as customer services or claims, others, such as actuarial, corporate executive/governance, and finance and accounting hold apparent promise.

Health plans have engaged in several strategies to achieve economically beneficial scale including business combinations and outsourcing. For instance, over two-thirds of the responding health plans who participated in 2004 *SEER* outsourced their Mental Health for their insured HMO products.

Figure 1. Economies of Scale
Areas of Significant Economies of Scale in 2004

| |
|--|
| All Other Sales and Marketing |
| Provider Relations Services |
| Case Management |
| Other Medical Management |
| Internet/eCommerce |
| IT Security Administration and Enforcement |
| Finance and Accounting |
| Actuarial |
| Legal |
| Corporate Executive/Governance |
| Miscellaneous Business Taxes |

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Also, health plans have consolidated. Blue Cross Blue Shield Plans have been especially active as the number of Blue Plans has decreased from 69 to 41 since 1995. Recently, Anthem and WellPoint Health Networks merged to form WellPoint, Inc. Prior to this transaction, Anthem acquired Trigon, and WellPoint purchased Cobalt, RightCHOICE and Cerulean.

Procedure

Selection of a Universe

Sherlock Company, in its *Sherlock Expense Evaluation Report*, has been compiling administrative expense information concerning health plans for seven years. We believe that this is the most complete and comprehensive data set available on health plan administrative expenses. Our universes include Blue Cross Blue Shield Plans, publicly traded companies, Medicaid-oriented health plans and Provider-sponsored health plans, and we have also compiled mixed sets of larger health plans and Medicare-oriented health plans, notwithstanding their providence. In all, the thirty-eight health plans served approximately one of every four or five Americans with health insurance.

We focused on the eighteen Blue Cross Blue Shield Plans that participated in the *Sherlock Expense Evaluation Report* (SEER) in 2004. Blue Cross Blue Shield Plans are similar because of a common heritage, similar business lines and that they operate under licensure rules of the Blue Cross Blue Shield Association. All the data was for the fiscal year ending December 31, 2003. They ranged in size from 170,000 to 4.3 million members, effectively excluding the pronounced economies of scale apparent as a health plan grows from being a start-up enterprise.

Data Preparation

To estimate scale, we defined units as the number of member months served per plan per year. Therefore, expenses were divided by member months to calculate costs per member per month.

We determined that an intuitive way of thinking about scale was to measure the effect of a doubling of the size of the business. To make this calculation, the raw data was transformed by taking the natural logarithm. Because a logarithm is an exponent, the natural logarithm is useful for solving equations in which the unknown appears as the exponent of some other quantity¹. Two statistical advantages resulted from the use of the logarithmic values over the raw values in these regressions concerning administrative expenses.

1. The logarithmic approach is sensitive to the likely reality that administrative expenses are not in fact linear. No matter how big a firm gets, unit costs may approach zero, but in fact they can never go negative.
2. Because logarithms are exponents, logarithmic values are a useful tool in estimating the effect of percentage changes in one factor on percentage changes in another.

Analyses

We then completed a series of regression analyses to determine the relationship between the independent variable of total member months and the dependent variables of administrative expense per member per month. Our analyses provided three statistics that allow us to measure the scale effects and determine the reliability of the analysis.

1. The measure of scalar effect was developed from the slope of the regression equation. Because we transformed the data by taking its logarithm, the slope is an exponent. Using the slope, it is possible to determine the unit costs for administrative expenses, expressed as a percent of their current value, for a percent change in members.

Since we wished to find what the effect of a doubling of membership would be, we then raised 2 (because of the doubling of the membership) to the power of the slope determined by our regression equations. This yields what the unit costs would be as a percent of the current value, under the assumption of a doubling of membership.

The effect of a change of membership leads to the function: $(1+X)^Y = Z$, where:

X = the percentage increase in membership,
Y = the slope of the regression equation for a certain area of expense, and;
Z = the scalar effect of a change in membership on that area of expense.

For example, assume that the slope of the regression for an administrative expense category was -0.5. A doubling of membership would mean that the cost of that expense would decrease to $2^{-0.5}$, or 70.7% of its current cost.

2. The R-squared statistic tells the percentage of variation in the data that is explained by the regression equation. If a regression has an R-squared of 100%, then all of the data points lie exactly on the regression line. An R-squared of zero implies that none of the variation in the data is explained by the regression equation and that the data is random.
3. The p-Value, an index of certainty for a research hypothesis, is derived from the t-statistic. The p-Value indicates the probability that the slope of the regression line is *not* different from zero. Our hypothesis was that a specific area of administrative expense (measured PMPM) would decrease as the number of member months increases. In other words, a lower p-Value gives us greater confidence that the relationship estimated by the regression equation exists. In our analysis we have considered results with p-Values of 10% or less as meaningful.

In tabulating the results, we also noted the number of observations for each functional area in which a statistical analysis was performed. Responses were nearly universal, except in the case of certain sub-classifications.

Results

The results of our analysis are presented below in Figure 2. Results that were statistically significant, measured by a p-Value less than 10%, are shaded. That is, we have arbitrarily assumed that a relationship between scale and costs is present if the statistical test indicates that this relationship would be explained by chance is 10% or less.

By way of example, we considered the Finance and Accounting results to be statistically significant because it had a p-Value of 3.7%. Of the total variation in Finance and Accounting costs between the Plans, 24.4%, the R-Squared, was explained by the membership differences. We estimate that a 100% increase in scale would lead to an increase equal to only 84.4% of the doubling of costs. We refer to this increase related to scale as the “scalar effect.” This relationship also can be visualized as a negative slope, that is, the greater size the lower the per member costs of such this administrative expense.

In aggregate, functional areas subject to scale effects represent 21.1% of total administrative expenses for these plans. The combined scale effect of these functional areas is 73.9%. That is, in the eleven administrative

expense areas in which scalability is evidenced, the per member per month cost is decreased to 73.9% of its original level when the size of membership is doubled. In the years that we have been performing this study, since 2001, the proportion of administrative expenses subject to economies of scale has ranged from 17.4% in 2001 to 34.1% in 2003. The scalar effects ranged from 83.1% in 2003 to this year’s 73.9%.

In 2004, the functional areas demonstrating economies of scale to a statistically significant degree included All Other Sales and Marketing, Provider Relations Services, Case Management, Other Medical Management, Internet/eCommerce, IT Security Administration and Enforcement, Finance and Accounting, Actuarial, Legal, Corporate Executive/Governance, and Miscellaneous Business Taxes.

Provider Relations Services and Miscellaneous Business Taxes also indicated scalability and were included in this analysis, although they may be affected by factors other than scale. For instance, Provider Relations Services may be a form of investment for health plans that have the means to make them. Accordingly they look like diseconomies of scale, in the same way that Internet / eCommerce did in 2001 and 2002. Miscellaneous Business Taxes are established by states, and it is unclear whether sheer size would have any effect.

Functional Area Results

An analysis of this kind is subject to variables other than scale, perhaps illustrated by the tendency for some of the changes in the measurable scalability. These may include changes in the investment priorities as well as other factors.

Rating and Underwriting: We have found that this functional area normally appears to be scalable., ranging from 73.8% to 87.9% since 2001. However, in 2004 the p-Value of the relationship between costs and scale was 27.4%, so we have not highlighted this.

(c) All Other Sales and Marketing Costs: In both 2003 and 2004, these costs have demonstrated scalability. (Among other things, these costs include individual product sales, sales management, planning and reporting and broker service.) At a p-Value of 7.9% the scalar effect was 61.9% in 2004.

(a) Provider Relations Services: These include call center and call center support, including provider inquiries. In both of the past two years, there has been a p-Value in

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Figure 2. Economies of Scale
Statistical Evidence of Scalar Effect on Administrative Expenses

| | Scalar Effect | R-Squared | p-Value | Observations |
|--|---------------|-----------|---------|--------------|
| Rating and Underwriting | 87.0% | 7.9% | 27.4% | 17 |
| Product Development / Market Research | 110.2% | 1.6% | 62.7% | 17 |
| Sales and Marketing (except Advertising and Promotio | 101.0% | 0.1% | 88.8% | 18 |
| (a) Account Services | 106.9% | 4.0% | 45.5% | 16 |
| (b) Member Communication | 125.2% | 5.2% | 39.5% | 16 |
| (c) All Other Sales and Marketing | 61.9% | 20.4% | 7.9% | 16 |
| Commissions (external) | 97.4% | 0.5% | 78.0% | 18 |
| Advertising and Promotion | 97.9% | 0.3% | 83.5% | 18 |
| Enrollment / Membership / Billing | 91.1% | 11.0% | 17.9% | 18 |
| Customer Services | 99.8% | 0.0% | 97.5% | 18 |
| Provider Network Management and Services | 105.3% | 3.1% | 48.8% | 18 |
| (a) Provider Relations Services | 131.1% | 20.1% | 8.2% | 16 |
| (b) Provider Contracting | 84.0% | 6.8% | 33.0% | 16 |
| (c) Provider Audit / Billing Validation | 76.4% | 8.3% | 36.5% | 12 |
| (d) Other Provider Network Management and Service | 112.6% | 1.8% | 62.0% | 16 |
| Medical Mgmt. / Quality Assurance / Wellness | 91.2% | 12.6% | 14.8% | 18 |
| (a) Pre-Certification | 116.4% | 6.0% | 42.0% | 13 |
| (b) Case Management | 76.7% | 20.3% | 8.0% | 16 |
| (c) Disease Management | 108.7% | 0.4% | 84.1% | 13 |
| (d) Nurse-based Counseling | 87.7% | 1.2% | 74.6% | 11 |
| (e) Other Medical Management | 82.6% | 36.3% | 1.4% | 16 |
| Claim and Encounter Capture and Adjudication | 102.9% | 1.7% | 60.9% | 18 |
| (a) Coordination of Benefits (COB) and Subrogation | 107.9% | 0.6% | 76.9% | 16 |
| (b) Other Claim and Encounter Capture and Adjudic | 105.1% | 4.2% | 44.4% | 16 |
| Total Information System Expenditures (as expensed) | 93.6% | 10.4% | 19.2% | 18 |
| (a) Information Systems Operations and Support Serv | 91.8% | 11.0% | 20.9% | 16 |
| (b) Information System Application and Maintenance | 112.4% | 4.3% | 46.0% | 15 |
| (c) Information Systems Applications Acquisition an | 81.4% | 10.1% | 23.1% | 16 |
| (1) Internet/eCommerce | 66.3% | 33.5% | 4.9% | 12 |
| (2) Stage III Amortization Costs | 99.8% | 0.0% | 98.7% | 10 |
| (3) Other | 60.5% | 26.2% | 10.8% | 11 |
| (d) IT Security Administration and Enforcement | 74.9% | 28.7% | 4.8% | 14 |
| (e) All Other Non-recurring Information Systems Exp | 102.7% | 0.1% | 96.3% | 6 |
| HIPAA | 94.2% | 0.7% | 74.2% | 18 |
| (a) IS Applications Acquisition and Development — | 84.7% | 3.2% | 55.9% | 13 |
| (b) Legal — HIPAA | 67.5% | 9.0% | 43.3% | 9 |
| (c) Other — HIPAA | 90.4% | 0.4% | 85.0% | 12 |
| Finance and Accounting | 84.4% | 24.4% | 3.7% | 18 |
| Actuarial | 71.9% | 34.7% | 1.0% | 18 |
| Corporate Services (HR, Facilities, Legal, Regulatory) | 92.7% | 8.1% | 25.2% | 18 |
| (a) Human Resources | 93.9% | 2.1% | 56.6% | 18 |
| (b) Legal | 79.7% | 36.1% | 0.8% | 18 |
| (c) Facilities | 105.1% | 1.8% | 59.9% | 18 |
| (d) Other Corporate Services | 92.1% | 2.1% | 56.9% | 18 |
| Corporate Executive / Governance | 68.5% | 36.8% | 0.8% | 18 |
| Association Dues and License/Filing Fees | 90.1% | 11.8% | 16.3% | 18 |
| Miscellaneous Business Taxes | 54.2% | 29.7% | 6.7% | 12 |
| Sub Total of 11 Significant Areas | 73.9% | NA | NA | NA |

the significant range (8.2% in 2004), but in both cases the slope was *positive* with a scalar effect of 131.1% in 2004.

Medical Management / Quality Assurance / Wellness:

This includes case management, disease management, precertification, nurse-based counseling as well as such activities as NCQA compliance and the analysis of medical costs and trends. In 2004 the scalar effect had a p-Value of 14.8% which is why we didn't highlight it. But note that in all previous years the p-Value was below the 10% target. Over the years, scalability ranged from 83.3% to 91.2% in 2004.

(b) Case Management: This is a subset of the above. In 2004, a 76.7% scalar effect was calculated with a p-Value of 8.0%. Prior years were only suggestive of a relationship between costs and scale.

Other Medical Management: This is also a subset of Medical Management / Quality Assurance / Wellness. At a p-Value of 1.4%, the scalability effect is 82.6%.

Information Systems Operations and Support: This seems to demonstrate some scalability, for instance in 2003 the relationship had a p-Value of 2.7%. However, any scale effect can be confounded by the need to invest in this functional area, and that these "investments" are often expensed. In 2004, we did not highlight this expense item since it had a p-Value of 20.9% on a scalability of 91.8%.

Internet/eCommerce: Like (a) Provider Relations Services, this has tended to display diseconomies, possibly reflecting investments. In 2001 and 2002, the scalar effects were 176.7% and 149.5% respectively. However, in 2004 it displayed scalability with a p-Value of only 4.9% and scalar effect of 66.3%. A scenario consistent with this finding is that among the largest of the plans the investment in Internet/eCommerce is behind them.

(d) IT Security Administration and Enforcement: As a new subcategory of Total Information Systems Expenditures (as expensed) introduced this year, we don't have any data for this area from 2001 to 2003. However, this area did display significance this year with a p-Value of 4.8% and scalar effect of 74.9%.

Finance and Accounting: This function has yielded low p-values since we commenced this study, with p-Values ranging from 11.0% in 2001 to 1.9% in 2002. In 2004, it demonstrated scalability of 84.4% with a p-Value of 3.7%.

Actuarial: This has demonstrated scalability since 2001, when it had a p-Value of 5.2% and was scalable by 75.6%. In 2004, its p-Value was 1.0% while its scalar effect was 71.9%. This is more significant with greater scalability than in 2003 when it yielded a p-Value of 1.5% and its scalability effect was 73.7%.

Figure 3. Economies of Scale
Comparison of Significant p-Values

| | 2004 | | 2003 | | 2002 | | 2001 | |
|--------------------------------------|---------|-------------|---------|-------------|---------|-------------|---------|-------------|
| | p-Value | Scalar Eff. | p-Value | Scalar Eff. | p-Value | Scalar Eff. | p-Value | Scalar Eff. |
| Rating and Underwriting | 27.4% | 87.0% | 4.4% | 84.0% | 1.7% | 73.8% | 21.5% | 87.9% |
| (c) All Other Sales and Marketing | 7.9% | 61.9% | 18.1% | 80.9% | NA** | NA** | NA** | NA** |
| (a) Provider Relations Services | 8.2% | 131.1% | 5.8% | 132.6% | NA* | NA* | NA* | NA* |
| Commissions | 78.0% | 97.4% | 92.1% | 101.0% | 17.2% | 117.8% | 5.2% | 126.5% |
| Med. Mgmt. / Qual. Assur. / Wellness | 14.8% | 91.2% | 8.4% | 89.1% | 4.1% | 85.1% | 3.1% | 83.3% |
| (b) Case Management | 8.0% | 76.7% | 28.2% | 88.8% | 20.2% | 80.7% | 97.2% | 98.1% |
| (e) Other Medical Management | 1.4% | 82.6% | 14.5% | 85.4% | 19.8% | 78.7% | 0.1% | 81.7% |
| Coordination of Benefits | 76.9% | 107.9% | 67.4% | 106.9% | 91.7% | 97.2% | 9.6% | 64.9% |
| Info. Sys. Ops and Support Services | 20.9% | 91.8% | 2.7% | 87.6% | 28.9% | 88.3% | 46.5% | 93.7% |
| (1) Internet/eCommerce | 4.9% | 66.3% | 37.8% | 81.4% | 6.1% | 149.5% | 16.4% | 176.7% |
| (d) IT Sec. Admin / Enforce. | 4.8% | 74.9% | NA* | NA* | NA* | NA* | NA* | NA* |
| Legal — HIPAA | 43.3% | 67.5% | 3.3% | 51.7% | 42.5% | 53.4% | NA** | NA** |
| Finance and Accounting | 3.7% | 84.4% | 2.8% | 87.7% | 1.9% | 81.4% | 11.0% | 86.1% |
| Actuarial | 1.0% | 71.9% | 1.5% | 73.7% | 0.2% | 63.7% | 5.2% | 75.6% |
| (b) Legal | 0.8% | 79.7% | 4.3% | 81.2% | 34.0% | 91.4% | 32.8% | 91.4% |
| (d) Other Corporate Services | 56.9% | 92.1% | 32.9% | 90.4% | 6.1% | 83.4% | 88.0% | 101.8% |
| Corporate Executive / Governance | 0.8% | 68.5% | 1.2% | 73.1% | 7.4% | 75.2% | 0.8% | 65.8% |
| Miscellaneous Business Taxes | 6.7% | 54.2% | 8.5% | 53.3% | 3.7% | 37.3% | 18.3% | 58.8% |

* Category introduced in 2004 study. Therefore, data is unavailable for comparable period.

** Data unavailable for period.

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(b) Legal: This has recently shown some scalability with p-Values of 0.8% and 4.3% and scalar effects of 79.7% and 81.2% for 2004 and 2003 respectively. However, in 2002, it had a high p-Value of 34.0% on a scalability of 91.4%. It had similar results in 2001 as it did in 2002.

Corporate Executive / Governance: Like Actuarial, the scalability in this area has demonstrated statistical significance since the inception of this analysis in 2001. p-Values have ranged from 0.8% in both 2001 and 2004 to 7.4% in 2002. Scalability has ranged from 65.8% in 2001 to 75.2% in 2002. In 2004, it had a scalar effect of 68.5%.

Miscellaneous Business Taxes: This has demonstrated scalability since 2002 when it had a p-Value of 3.7% and scalability effect of 37.3%. In 2003, it yielded a p-Value of 8.5% with a scalar effect of 53.3%. This year, its p-Value was a lower 6.7% and its scalability was 54.2%. As previously stated, it isn't clear as to whether size has any effect on the scalability of this functional area.

Note that there are a number of important areas in which no economies of scale ever seem to be evident. These include such key areas as Enrollment / Membership / Billing, Customer Services and Claim and Encounter Capture and Adjudication. These central functions as well as some other non-scalable activities comprised 78.9% of all of health plan administrative expenses in 2003. While in the low margin health plan business served by Blue Cross Blue Shield Plans there are economic benefits to scale, it is also true that most expenses are in fact not scalable at least at the size of plans in this universe.

Application of this Analysis

The implications of this analysis are important to firms considering strategies to enhance their competitive position, particularly in health insurance markets that reward low administrative expenses. Strategies informed by this analysis include business combinations, consolidation of regional operations, outsourcing or the acceleration of growth strategies.

Business Combinations of Firms of Similar Size

For example, assume that a health plan is considering a merger with another similar organization. Suppose also at this stage in its discussions, it has only limited information concerning its proposed partner's operations, say statutory blanks or SEC filings.

This analysis has two important functions. First it can be employed to identify areas in which savings could be expected to occur and to quantify their magnitude. Secondly, this analysis can be used to estimate the effect of such savings on the bottom line and, hence the premium that the acquirer could justify to pay for a controlling interest in the plan.

This can be illustrated by example. Suppose the two companies illustrated in Figure 4 are considering a merger. Further assume that both companies are similar in all important respects, with equivalent membership, health benefit ratio, administration expenditures, and revenues. This is the equivalent of the scalar assumption used in our analysis.

Figure 4. Economies of Scale

Evidence of Scalability

Assumptions

| | Company A | Company B | Combined |
|-------------------------------|---------------|---------------|---------------|
| Members | 1,000,000 | 1,000,000 | 2,000,000 |
| Revenues PMPM | \$180.00 | \$180.00 | |
| Health Benefit Ratio | 86.0% | 86.0% | |
| Admin / Premium | 12.0% | 12.0% | |
| Scalable Proportion of Admin. | 21.1% | 21.1% | |
| Scalable Admin / Premium | 2.5% | 2.5% | 1.9% |
| Scale effect | | | 73.9% |
| Scalable Administration | | | \$80,915,381 |
| Non Scalable Admin / Premium | 9.5% | 9.5% | |
| Non Scalable Administration | \$204,469,540 | \$204,469,540 | \$408,939,079 |

Income Statements

| | Company A | Company B | Combined |
|-------------------------|-----------------|-----------------|-----------------|
| Revenues | \$2,160,000,000 | \$2,160,000,000 | \$4,320,000,000 |
| Health Benefits | 1,857,600,000 | 1,857,600,000 | 3,715,200,000 |
| Administration | 259,200,000 | 259,200,000 | 489,854,460 |
| Operating Profits | \$43,200,000 | \$43,200,000 | \$114,945,540 |
| <i>Operating Margin</i> | <i>2.0%</i> | <i>2.0%</i> | <i>2.7%</i> |

In this instance, the model estimates that the scalar effects would provide 33.0% greater operating earnings to the combined companies (\$114.9 / \$86.4 -1) than would be the case by simply summing their results. The administrative expense ratio is assumed to be 12.0% for both companies. Based on our analysis, 21.1% of administrative expenses, or 2.5 percentage points of the administrative expense to premium ratio, are subject to a weighted average scale effect of 73.9%.

After merging, administrative expenses that are subject to scale effects are reduced to 1.9% of premiums from 2.5% of premiums. Accordingly the operating margin increases by the same 0.7 percentage points that the administrative expense ratio declines. (Note that the increase in operating margin may differ slightly from the decline in the administrative expense ratio due to rounding effects.) In the example in Figure 4, operating profits increased by 33.0% from the sum of the companies or by \$28.5 million.

Business Combinations of Firms of Different Sizes

The way we have illustrated the scalar effect assumes a merger of two firms of equal size and calculates scale as the effect on the combined firms. This unusual case can be generalized to firms that are unequal in size, by estimating the marginal scalar effects on the target firm.

We estimated the marginal scalar effects in several steps. Beginning with the scalar effect as calculated in the case in which the firms are of equal size, we first calculated the percentage points of post-scalar effect across all membership only on PMPM administrative expenses attributable to the target. Then, by dividing this value by

a factor representing the proportion of the target company of the new larger company, we calculated the effect of scale on the expenses of the target company alone.

For instance, the 84.4% finance and accounting scalar effect translates to a 68.9% marginal scalar effect, when both of the firms are the same size. However, if the target firm is only 10% the size of the suitor, that marginal scalar effect is 74.7%, meaning that it is that proportion of the expected costs of the target firm's finance and accounting costs will be retained in the target company.

Figure 5 shows the marginal scalar effects on a variety of scenarios of relative size of suitor and target. The differences between the scalar effects affecting each expense in the various scenarios stem from the fact that the scale effects of each expense are described as curves of different convexity. The total reflects a blended weighting of these curves.

The scale effects are also illustrated in Figure 6. Note that the greater the size of the target relative to the suitor, the lower the proportion of expenses of that target (of those normally subject to scale) are retained. The idea of economies of scale is that as a firm adds a greater number of units it spreads fixed costs more thinly, lowering average costs.

This analysis can be understood through example. Figure 7 is similar to Figure 4 in that it shows the application of economies of scale as they apply to business combinations, however, the target is assumed to be one-half, as opposed to equal in size to, the acquirer. Accordingly, the economies of scale are less strong, (0.3 percentage point increase to Company A's margins versus 0.7 percentage point increase in the previous example) but

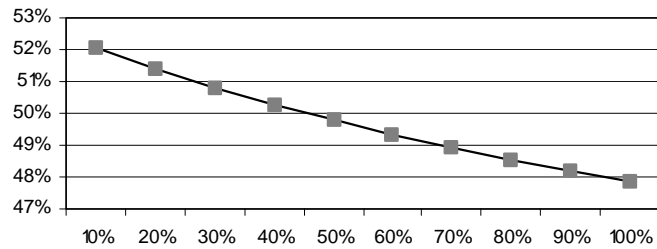
Figure 5. Economies of Scale
Marginal Scalar Effect

| | Candidate as a Percent of Suitor | | | | | | | | | |
|-------------------------------|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| (c) All Other Sales and Mktg. | 29.8% | 28.9% | 28.1% | 27.3% | 26.6% | 26.0% | 25.4% | 24.8% | 24.3% | 23.8% |
| (a) Provider Relations Svcs. | 141.7% | 144.2% | 146.7% | 149.1% | 151.4% | 153.7% | 155.9% | 158.0% | 160.1% | 162.1% |
| (b) Case Management | 60.7% | 59.6% | 58.7% | 57.8% | 56.9% | 56.2% | 55.4% | 54.7% | 54.1% | 53.5% |
| (e) Other Medical Mgmt. | 71.5% | 70.6% | 69.8% | 69.0% | 68.3% | 67.6% | 67.0% | 66.4% | 65.8% | 65.2% |
| (1) Internet/eCommerce | 39.7% | 38.6% | 37.7% | 36.8% | 36.0% | 35.2% | 34.5% | 33.9% | 33.3% | 32.7% |
| (d) IT Sec. Admin./ Enforc. | 57.1% | 56.1% | 55.1% | 54.2% | 53.3% | 52.5% | 51.8% | 51.1% | 50.4% | 49.8% |
| Finance and Accounting | 74.7% | 73.9% | 73.1% | 72.4% | 71.7% | 71.1% | 70.5% | 69.9% | 69.4% | 68.9% |
| Actuarial | 51.2% | 50.1% | 49.1% | 48.2% | 47.3% | 46.5% | 45.7% | 45.0% | 44.4% | 43.7% |
| (b) Legal | 66.3% | 65.3% | 64.4% | 63.6% | 62.8% | 62.1% | 61.4% | 60.7% | 60.1% | 59.5% |
| Corp. Executive / Governance | 44.1% | 43.1% | 42.1% | 41.2% | 40.3% | 39.6% | 38.8% | 38.1% | 37.5% | 36.9% |
| Misc. Business Taxes | 11.2% | 10.8% | 10.4% | 10.0% | 9.7% | 9.4% | 9.1% | 8.9% | 8.7% | 8.4% |
| TOTAL | 52.1% | 51.4% | 50.8% | 50.3% | 49.8% | 49.4% | 48.9% | 48.5% | 48.2% | 47.8% |

P · U · L · S · E Analysis

Figure 6. Economies of Scale

Ratio of Candidate-to-Suitor on Marginal Scale Effect



Another path to achieving these available economies of scale may lie in outsourcing arrangements. Firms such as TriZetto, Accenture, EDS and Perot Systems have all made significant commitments to the service of health plans.

Also, health plans can provide these services to each other. Rather than merging the entire operations of two health plans, the scalable areas of administrative expense can be combined where a single best-in-class firm can take on, for example, the actuarial work of multiple plans. Such arrangements reduce the cost of both vendor and customer. In each of these cases, economies of scale can be achieved without major corporate restructuring including, in some cases, the need to change corporate form.

important efficiencies improve the margins of the combined organizations. Operating profits improve by 18.1% with operating income increasing by \$27.5 million.

Application to Other Strategies

Economies of scale can be achieved through strategies other than business combinations, including management contracts and outsourcing arrangements. These strategies may achieve similar economies while retaining local identity.

¹ In mathematics, the logarithm functions are the inverses of the exponential functions. If x is b to the power y , $x = b^y$, then it is said that y is the logarithm of x in base b . For natural logarithms, base b is represented by the irrational number e (approximately 2.718). This is considered to be the natural logarithm because elements of growth and decay in nature tend to follow the function of this natural logarithm.

Figure 7. Economies of Scale
Scalability For Firms of Different Sizes

| Assumptions | <u>Company A</u> | <u>Company B</u> | <u>Company B After Scale</u> | <u>Combined</u> |
|-------------------------------|------------------|------------------|------------------------------|-----------------|
| Members | 2,000,000 | 1,000,000 | 1,000,000 | 3,000,000 |
| Revenues PMPM | \$180.00 | \$180.00 | \$180.00 | |
| Health Benefit Ratio | 86.0% | 86.0% | 86.0% | |
| Admin / Premium | 11.5% | 12.0% | 10.7% | |
| Scalable Proportion of Admin. | | 21.1% | | |
| Scalable Admin / Premium | 0.0% | 2.5% | | |
| Marginal Scale effect | | 49.8% | | |
| Scalable Administration | | 54,730,460 | 27,258,676 | |
| Non Scalable Admin / Pre | 11.5% | 9.5% | | |
| Non Scalable Administrati | 496,540,402 | \$204,469,540 | \$204,469,540 | |
| Income Statements | <u>Company A</u> | <u>Company B</u> | <u>Company B After Scale</u> | <u>Combined</u> |
| Revenues | \$4,320,000,000 | \$2,160,000,000 | \$2,160,000,000 | \$6,480,000,000 |
| Health Benefits | 3,715,200,000 | 1,857,600,000 | 1,857,600,000 | 5,572,800,000 |
| Administration | 496,540,402 | 259,200,000 | 231,728,215 | 728,268,617 |
| Operating Profits | \$108,259,598 | \$43,200,000 | \$70,671,785 | \$178,931,383 |
| Operating Margin | 2.5% | 2.0% | 3.3% | 2.8% |