Analysis of ROI for Pharmaceutical Promotion (ARPP)

Dick R. Wittink, Ph.D.
General George Rogers Clark Professor
of Management and Marketing
Yale School of Management

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Study Objectives

To follow up on an earlier study (RAPP) that:

- Measured ROI for detailing (DET), direct-to-consumer advertising (DTC), medical journal advertising (JAD), and physician meetings and events (PME)
- Examined how ROI differs according to brand size (in revenues) and launch date

Modify the earlier study by:

- Adding data for 2000 to the 1995-1999 database – additional observations to obtain more recent ROIs
- Altering brand size categories to more accurately reflect market realities
- Exploring ROIs for specific therapeutic categories

The objective of this study is to follow up on the RAPP analysis, presented last year by Scott Neslin of Dartmouth College. His study estimated the ROIs of marketing investments, separately for each of the four major pharmaceutical promotion tactics, on revenues for branded prescription drugs with at least $25 million revenues in 1999.

This follow-up study includes data, both revenue and marketing expenditures, for the year 2000 which increases the monthly observations available for analysis. We use new brand revenue levels for the categorization of brands to more closely reflect the realities in the market, and we also estimate ROIs separately for several therapeutic classes.

Overall Approach

- Utilize historical data from syndicated secondary data sources
- Apply a standard statistical technique (ordinary least squares regression, also referred to as multiple regression analysis) to pooled data, but separately for groups of brands generating:
  - At least $500MM in at least 1 year of the period 1995-2000
  - Between $100-500MM, but never >$500MM
  - Always <$100MM, but at least $25MM in 2000
- Allow effects to depend on the time of launch (<1994, 1994-1997, 1998-2000)
- Analyze average results by estimating ROI for each revenue/launch date cell
- Apply the same approach to therapeutic category analyses, but without revenue/launch date cells

The use of historical data has the advantage that we use real-world actions and outcomes to determine how past decisions about investments in promotion tactics may have resulted in performance outcomes. The disadvantage of doing this is that the world is very complex, and it is impossible to incorporate all possible influences in a single statistical analysis. Another potential disadvantage is that we estimate a single effect jointly for all brands in a given group. In effect, the results for a revenue/time of launch cell are based on a retrospective analysis of a large number of brands, unlike experimental studies companies may conduct for individual brands. Thus, the average effects we report may not be directly applicable to a single prescription drug.

However, we report very interesting tendencies that will be useful to all managers. One could decide that these tendencies are so compelling that reallocations of expenditures across promotion tactics are appropriate. Or one could decide that the results should be the basis for field experiments for individual drugs. Importantly, despite the fact that our results are not directly applicable to an individual drug, the results are sufficiently strong and intriguing for further discussion and action.

In terms of brand revenues, in this study the highest revenue level is $500MM+, compared to $200MM+ in the Neslin study. The intermediate brand revenue level is $100MM-$500MM, compared to $50MM-$200MM used in Neslin. And the small brand segment has been changed accordingly.

Data

- All brands with $25 million or more in revenue in 2000
- 392 branded drugs
- 127 generic drugs
- Data from 1995-2000
- 21,436 monthly observations

The data are based on all brands with revenues of at least $25 million in 2000, but launched before 2000. We excluded brands launched in 2000 because for each of those brands we would have at most 12 observations. New brands have complex and often unpredictable sales patterns in the early time period. We capture those patterns with four brand-specific variables. For the typical brand launched in 2000 that would leave us with insufficient data to help estimate the effects of promotion activities.

With 392 brands and 21,436 monthly data, an increase of 28% over the Neslin study, we have an average of 55 observations per brand. However, not all brands use all promotion tactics. There are also 127 generics in the database, which may help explain changes in revenues for some brands. We note that for any brand with zero expenditures in a given promotion tactic (see data provided later), this variable is irrelevant in the estimation of effects. By the same token, the average ROI for a promotion tactic would also not apply to brands with zero activities for that tactic.

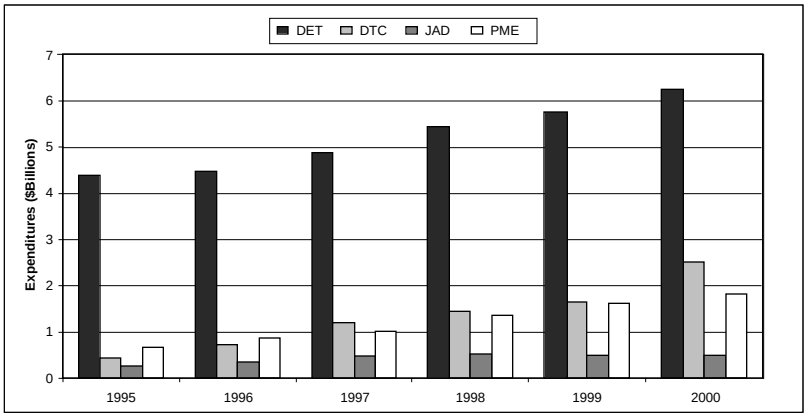
Key Variables

- DET detailing dollars includes 1-to-1 physician visits, but excludes samples (Scott-Levin)
- DTC direct-to-consumer dollars: includes television, print, radio, and outdoor (Scott-Levin)
- JAD medical journal advertising dollars (PERQ/HCI)
- PME physician meetings & events dollars (Scott-Levin)
- Scripts number of scripts filled at retail (Scott-Levin)
- Price retail pharmacy price per script (Scott-Levin)

Detailing (DET), defined as expenditures on physician visits, tends to be the dominant marketing activity for branded products. Direct-to-consumer (DTC) advertising has seen substantial growth since 1997. It includes television, print, radio and outdoor advertising expenditures. Medical journal advertising (JAD) represents expenditures in both primary care and specialty journals. Physician meetings and events (PME) covers expenditures on physician meetings of many kinds.

These four variables are the variables of interest: the analysis is intended to estimate how changes in these variables relate to unit sales (scripts) for the individual drugs. After the effect of change in expenditures in a promotion activity on unit sales is estimated, we use the average price per script (for the appropriate subset of drugs) to estimate the marginal return on investment (ROI). ROI represents the estimated change in revenues for a $1 increase in spending on a promotion activity.

Total Drug Marketing Expenditures



- Total Drug Marketing Expenditures grew at 13.7% per year
  - DET 7.1% per year
  - DTC 44.3% per year
  - JAD 7.6% per year
  - PME 22.1% per year

The total drug marketing expenditures for the four major promotional tactics have grown at an average annual growth rate of 13.7% from 1995-2000. As you can see from the bar chart, DET has had the largest allocation of funds each year. In 2000 there was $6.2 billion spent on DET. The annual growth rate for detailing has been 7.1%, but that is on a very large base. DTC has the highest annual growth rate, 44.3% per year, starting from an expenditure of $400 million in 1995, which grew to $2.5 billion for 2000. PME expenditures have grown from $700 million in 1995 to $1.9 billion in 2000, a rate of 22.1% each year. JAD has had the lowest allocation of funds among the four tactics, and the growth rate has been a modest 7.6%. Though it is difficult to see on the chart, expenditures on JAD have been very level for the last four years at just over $500 million. If you look at just the last four years from 1997-2000, the average annual growth rate has been 0.3%.

It should be noted that these are total drug marketing expenditures, not just those for the branded drug products that were included in this study.

Methodology Regression Analysis

- Regression analysis is a widely used statistical method that estimates how a criterion variable, such as sales, depends on one or more predictor variables, such as the promotion tactics. In this method, the assumption is made that sales depend on promotion in a particular way. Given this, partly testable, assumption the statistical method provides the best possible estimate of the magnitude of the effect on sales when marketing is increased by one unit (dollar).
- To conduct regression analysis meaningfully, the equation used has to be justified in terms of, for example, variables used and controlled for. There exists a large body of research that addresses questions in this area.

The best way to think of the basic idea behind the method is that it attempts to calculate average values of the variable of interest, sales in our case, conditional upon specific values of one or more predictor variables, such as marketing. For example, suppose that the average unit sales when we spend $1K on detailing is 100, and that this average is 150 when we spend $2K on detailing. Assuming that sales depends on detailing, we would then conclude that an increase of $1K in detailing tends to add 50 units in sales. And if each unit has a price of $50, we observe an increase in revenues of $2.5K for an increase in expenditures of $1K. In this example, ROI = $2.5.

Of course, if other relevant things change at the same time, we want to take those changes into consideration. That represents one of the many complexities of multiple regression analysis. The objective of regression analysis is to determine, in our application, how unit sales of individual prescription drugs on average change with changes in expenditures in a given promotion tactic, holding other variables constant.

Methodology
Computing ROI

- Return on investment (ROI) is calculated by estimating how unit sales (prescriptions) depends on expenditures for each of the promotion tactics, and multiplying this unit sales change for an investment of $1 by the script price. The multiple regression result shows how unit sales depends on the individual expenditures, holding other things constant.
- So, ROI is the estimated increase in revenues for a $1 increase in each variable, DET, DTC, JAD, PME, one at a time.
- ROI = change in unit sales (for a $1 increase in a promotion tactic) x average unit price per script

The multiple regression analysis of monthly data provides estimates of the unit sales effect for each promotion tactic. This is done separately for three groups of brands based on revenues. Also, for each group the unit sales effects, and hence the ROIs, are allowed to depend on the launch date.

Each unit sales effect (prescription), for a $1 increase in a given promotion tactic, is then multiplied by the average price per script for the drugs in the category to obtain the estimated ROI.

Revenue/Launch Year Cells Profile I

	Launch Year		
	<1994	1994-1997	1998-2000
$25-$100MM			
Number of Brands	86	37	14
PCP Fraction	43%	37%	38%
Scripts 1,000/mo	154	79	62
Revenues/Year	$43MM	$34MM	$46MM
$100-$500MM			
Number of Brands	112	59	21
PCP Fraction	50%	43%	53%
Scripts 1,000/mo	475	179	159
Revenues/Year	$144MM	$134MM	$143MM
$500MM+			
Number of Brands	36	18	9
PCP Fraction	52%	53%	58%
Scripts 1,000/mo	1126	718	609
Revenues/Year	$692MM	$585MM	$627MM

We show the nine brand revenue/time of launch cells for which we have calculated separate ROI estimates for each of the four promotion tactics. Note that the intermediate revenue category has the largest number of brands. In addition, for each revenue category, the number of brands declines with the recency of the launch date. The fraction of brand revenues attributable to primary care physicians varies from less than 40 percent (recently launched, small brands) to almost 60 percent (recently launched, large brands).

Revenue/Launch Year Cells Profile II

	Launch Year		
	<1994	1994-1997	1998-2000
$25-$100MM			
%moDET/AVG $Kmo	94%/$ 155	92%/$ 460	100%/$1144
%moDTC/AVG $Kmo	10%/$ 13	24%/$ 45	21%/$ 5
%moJAD/AVG $Kmo	73%/$ 8	92%/$ 36	100%/$ 148
%moPME/AVG $Kmo	85%/$ 13	89%/$ 56	86%/$ 180
$100-$500MM			
%moDET/AVG $Kmo	100%/$ 732	100%/$1098	95%/$1711
%moDTC/AVG $Kmo	26%/$ 38	53%/$ 272	38%/$ 949
%moJAD/AVG $Kmo	79%/$ 41	98%/$ 113	100%/$ 161
%moPME/AVG $Kmo	93%/$ 73	95%/$ 210	95%/$ 439
$500MM+			
%moDET/AVG $Kmo	100%/$2758	100%/$3206	100%/$6607
%moDTC/AVG $Kmo	67%/$ 605	67%/$1224	78%/$2482
%moJAD/AVG $Kmo	92%/$ 129	100%/$ 245	100%/$ 532
%moPME/AVG $Kmo	100%/$ 427	100%/$ 698	100%/$1917

Note: % of products with expenditures for the promotion tactic at some time during the study and the average monthly expenditures in $000 for brands with investment in the tactic.

This screen provides a profile of each cell showing the proportion of brands with promotional funds allocated to each tactic at some time during the study period, and the average monthly expenditure for the brands in the cell with expenditures for that tactic.

To illustrate, the upper left entry says that 94 percent of the brands with $25-$100MM revenues launched before 1994 had at least some detailing expenditures. For those brands with at least some detailing, the average monthly detailing expenditure was $155,000.

It is also interesting to note that over 90 percent of the brands in each cell allocated promotional funds to DET, and for those brands the average monthly expenditures for DET are higher than comparable numbers for the other promotion tactics. DTC is used by fewer brands than any other tactic, but for brands with higher revenues, the frequency of funds allocation to DTC is also higher, as is true for the average monthly expenditure. PME is utilized for 85 percent of the brands, and for this tactic the average investment is higher for the most recently launched brands with large revenues. While JAD is used quite frequently, it has the lowest average expenditure in 7 of the 9 cells.

Brands in $500MM+, Launch Year 1998-2000 Cell

	Range of Monthly Expenditures ($000)			
Brand	DET	DTC	JAD	PME
Actos	$658- 7593	$0- 2741	$0-1244	$609- 3065
Avandia	5118-10099	0-10053	167-1047	646- 2912
Celebrex	10965-28750	0-12424	6-1345	2092-12545
Celexa	3840-11300	0- 0	82-1916	742- 4642
Enbrel	88- 1079	0- 3204	0- 212	0- 334
Plavix	176- 6692	0- 0	0- 876	133- 1939
Singulair	1926- 7636	0-11959	0-1738	523- 3619
Viagra	514-16646	0-10825	0-2267	476- 4325
Vioxx	4293-19226	0-28455	0-1754	689- 7038

This screen shows the minimum and maximum monthly expenditures for each tactic for the nine brands that belong to the highest revenue, most recent launch date cell. These data show there is a large amount of variation between the brands and within the brands over time. For example, Actos has a minimum of $658,000 and a maximum of $7,593,000 in monthly detailing expenditures. These numbers are, however, far smaller than for Avandia which has a minimum of $5,118,000 and a maximum of $10,099,000.

It should be noted that the regression model uses only the variation within brands for the calculation of promotion effects on unit sales. And it does this to the extent that the variation in sales over time is not captured by the diffusion of a new drug in the marketplace. For the diffusion of sales, the model includes four brand-specific variables that allow each brand to have a unique sales diffusion pattern. Importantly, because we use these brand-specific variables, the promotion effects, and hence the ROIs, are based on variation in sales and promotion expenditures within brands and not on differences between brands.

All nine of these brands allocated funds to DET, JAD and PME, but only seven allocated funds to DTC. For the seven brands that allocated funds to all four tactics, DET has the highest monthly average expenditures with the exception of Singulair and Vioxx. For JAD the average monthly expenditures are the lowest of all the tactics. The DTC expenditures show a wide range of expenditures, as does PME.

Average Revenue Impact Estimates (ROIs) $500MM+ (n=63)

	<1994	1994-1997	1998-2000
DET	$3.1	$5.9	$11.6
DTC	$0.4	$0.7	$ 1.3
JAD	$3.1	$6.2	$12.2
PME	$3.1	$6.0	$11.7

For the 63 largest revenue brands, we show average ROIs for each promotion tactic. These average effects are allowed to depend on the launch date for each of the brands. A higher ROI doesn't necessarily mean that one tactic is better than another tactic with a lower ROI. The ROIs are influenced by the amount of spending within a tactic. There is an extremely high consistency in ROIs between the instruments, except for DTC. Magnitudes greater than $1.0 suggest that positive returns are available, on average, for DET, JAD, and PME. But the magnitudes of the returns are highest for the newest drugs. However, the more intense the competition between brands in a given therapeutic category, the more the ROIs have to be discounted for competitive reactions. In other words, the ROIs represent the returns under the assumption that competitors do not react. Additional analyses would be required to determine how 'net' ROI effects compare across instruments by taking competitive reactions into account.

These results suggest that, on average, spending on DTC does not provide a high return. However, it is possible that DTC has a market expansion effect by increasing disease and/or product awareness. By contrast, promotion tactics directed to physicians tend to be for patients with diagnosed diseases. A possible consequence is that competitive reactions are more modest for market expansion tactics. Thus, if competitive reactions were taken into account, the 'net' ROIs might be reduced more for DET, JAD and PME than for DTC. Other possible explanations of the low ROIs for DTC are that the expenditures are far less targeted than is true for the promotions to physicians. Also, whereas DET, JAD and PME are aimed at physicians who see patients for whom they typically prescribe a brand, DTC is aimed at consumers who may not have been diagnosed with a disease for which the brand is relevant.

Lower and Upper Bounds
$500MM+ (n=63)

	<1994	1994-1997	1998-2000
DET			
Bounds	$2.5-$4.5	$4.9-$9.0	$9.5-$18.2
Average	$3.1	$5.9	$11.6
DTC			
Bounds	$0.3-$0.7	$0.5-$1.4	$1.0-$2.8
Average	$0.4	$0.7	$1.3
JAD			
Bounds	$1.8-$11.1	$3.6-$21.8	$6.9-$43.2
Average	$3.1	$6.2	$12.2
PME			
Bounds	$2.3-$4.9	$4.6-$9.9	$8.8-$20.2
Average	$3.1	$6.0	$11.7

Note: Lower and upper bounds represent 95% confidence, plus or minus two standard errors

This shows the statistical reliability of the ROI estimates. The reliability is expressed in terms of 95 percent confidence intervals for the true average ROI, which captures plus or minus two standard errors. To illustrate, for DET <1994 we are quite sure that the true average ROI is no less than $2.5 and no more than $4.5.

It is noteworthy that the reliability decreases for more recently launched drugs. This is partly because we have fewer drugs as the launch date advances and partly because we tend to have fewer observations per brand for the more recent launch dates. The reliability is also smaller for JAD than for PME, while it is greatest for DET. This is primarily due to differences in the amount of variation over time, within brands, between the promotion tactics.

Average Revenue Impact Estimates (ROIs) $100-$500MM (n=192)

	<1994	1994-1997	1998-2000
DET	$1.2	$1.6	$2.1
DTC	$0.1	$0.2	$0.2
JAD	$2.3	$3.1	$4.2
PME	$2.0	$2.7	$3.6

For the 192 brands with intermediate revenues, we obtain smaller ROIs than for the largest revenue brands. In general, these ROIs are much closer to $1.0, except for DTC where the return is close to zero. In addition, the returns are highest for JAD, followed by PME and DET.

Note also that the more recently launched brands again have higher ROIs. However, the magnitudes are not nearly as different between the launch date periods here as for the highest revenue brands.

Lower and Upper Bounds $100-$500MM (n=192)

	<1994	1994-1997	1998-2000
DET			
Bounds	$1.0-$1.4	$1.4-$1.9	$1.8-$2.6
Average	$1.2	$1.6	$2.1
DTC			
Bounds	$0.1-$0.2	$0.1-$0.3	$0.1-$0.4
Average	$0.1	$0.2	$0.2
JAD			
Bounds	$1.7-$3.5	$2.3-$4.9	$3.1-$6.4
Average	$2.3	$3.1	$4.2
PME			
Bounds	$1.7-$2.4	$2.3-$3.3	$3.1-$4.5
Average	$2.0	$2.7	$3.6

Note: Lower and upper bounds represent 95% confidence, plus or minus two standard errors

We see that the reliability of the ROIs is quite high for the intermediate brands. For example, for brands launched before 1994, we are quite sure that the true average ROI for DET is no less than $1.0 and no more than $1.4. As before, the reliability tends to decrease for more recently launched brands, largely because the number of brands declines with the launch date. Also, the reliability is smallest for JAD, followed by PME.

Average Revenue Impact Estimates (ROIs) $25-100MM (n=137)

	<1994	1994-1997	1998-2000
DET	$0.9	$1.0	$1.0
DTC	$0.0	$0.0	$0.0
JAD	$6.2	$6.7	$7.2
PME	$0.1	$0.1	$0.1

For the 137 brands with lowest revenues, we observe a pattern that differs remarkably from the earlier ROIs. Our best estimates are that both DTC and PME provide negative returns, returns below investment, for the brands that engage in these activities. For DET, the ROI is close to $1.0. But for JAD, the estimates are very large. This suggests that for these brands, on average, JAD provides high potential for investments.

The other aspect to note is that we now see very little dependence of the ROIs on the launch date. For all practical purposes, the ROIs do not vary with the launch date.

Lower and Upper Bounds $25-100MM (n=137)

	<1994	1994-1997	1998-2000
DET			
Bounds	$0.7-$1.1	$0.8-$1.2	$0.8-$1.3
Average	$0.9	$1.0	$1.0
DTC			
Bounds	$0.0-$0.2	$0.0-$0.2	$0.0-$0.2
Average	$0. 0	$0.0	$0.0
JAD			
Bounds	$4.9-$8.1	$5.3-$8.8	$5.7-$9.5
Average	$6.2	$6.7	$7.2
PME			
Bounds	$0.0-$0.3	$0.0-$0.3	$0.0-$0.3
Average	$0.1	$0.1	$0.1

Note: Lower and upper bounds represent 95%confidence, plus or minus two standard errors

The statistical reliability is lowest for JAD. However, we are quite sure that, independent of the launch date, the ROI for JAD is not less than $4.9 and not more than $9.5. This suggests that in all cases, the upward potential is very high for JAD. For example, note that the highest upper bound for any instrument, other than JAD, is $1.3 (DET, 1998-2000). Yet, the smallest lower bound for JAD in any launch date category is $4.9.

Average Revenue Impact Estimates (ROIs) by Revenue/Launch Date

	<1994	1994-1997	1998-2000
DET			
$25-$100MM	$0.9	$1.0	$ 1.0
$100-$500MM	$1.2	$1.6	$ 2.1
$500MM+	$3.1	$5.9	$11.6
DTC			
$25-$100MM	$0.0	$0.0	$ 0.0
$100-$500MM	$0.1	$0.2	$ 0.2
$500MM+	$0.4	$0.7	$ 1.3
JAD			
$25-$100MM	$6.2	$6.7	$ 7.2
$100-$500MM	$2.3	$3.1	$ 4.2
$500MM+	$3.1	$6.2	$12.2
PME			
$25-$100MM	$0.1	$0.1	$ 0.1
$100-$500MM	$2.0	$2.7	$ 3.6
$500MM+	$3.1	$6.0	$11.7

To summarize, the average ROIs range from $0.0 to $12.2. This suggests that there is a tremendous opportunity for reallocation of promotion budgets. If we assume that the 'net' ROIs (taking competitive reactions into account) are comparable, these results suggest, on average, that overspending occurs when the ROI is less than $1.0 (DTC almost always, PME for the smallest brands), that spending is close to optimal when the ROI is close to $1.0 (DET for some cases, DTC for the largest and most recent brands), and the farther ROI is above $1.0 the more underspending occurs. The greatest opportunities for investments are for DET, JAD and PME for the largest and most recent brands, followed by the largest brands launched in 1994-1997 for the same tactics and for JAD for the smallest brands and all launch dates.

Budget Scenario 1 – Decrease of $1MM

Product Profile: $100-500MM, Launched 1994-1997

Average/Yr: DET=$13.2MM, JAD=$1.4MM, PME=$2.5MM

- Option A – Reduce JAD by $0.5MM, DET and PME by $0.25MM each

  Predicted Revenue Change = -$2.6MM

  $3.1(-$0.5MM)+$1.6(-$0.25MM)+$2.7(-$0.25MM)

- Option B – Reduce DET only, by $1MM

  Predicted Revenue Change = -$1.6MM

  $1.6(-$1MM)

Many times during the course of a year, adjustments occur in promotional budgets. How can we use the average ROIs to predict revenue changes for changes in the promotional budget? Consider a typical example: a budget cut of $1 million. Since 49% of the brands in this study have revenues between $100-$500MM, we use this revenue level and estimate the impact on a brand launched between 1994-1997. Assume that the brand has expenditures for DET, JAD, and PME, but not for DTC. To see how this budget cut compares to a normal budget, we show average annual expenditures for the average brand by multiplying the monthly expenditures shown in the brand profiles by twelve to approximate annualized expenditures for each tactic.

Suppose that Product Manager A decides that 50% of the budget cut should come from JAD and the other 50% will be shared equally by DET and PME. The revenue change can be predicted by calculating the reduction in revenues using the ROI for the individual tactic multiplied by the reduction in the budget for that tactic. As you can see in the example, the ROI for JAD is $3.1 and is multiplied by the budget reduction and the same calculation is done for DET and PME. The result of the budget cuts by Product Manager A is a sales decline of $2.6MM

Product Manager B, on the other hand, may decide that only the budget for DET should be reduced, so it will be reduced by the full budget cut of $1MM. Using the same methodology, the predicted revenue change is only a decline of $1.6MM.

In this scenario, the choice made by Product Manager B is the more attractive proposition.

Budget Scenario 2 – Increase of $1MM

Product Profile: $100-500MM, Launched 1998-2000

Average/Yr: DTC=$11.4, JAD=$1.9MM, PME=$5.1MM

- Option A – Increase JAD by $0.1MM, PME by $0.25MM
  DTC by $0.65MM, no change for DET
  Predicted Revenue Change = +$1.45MM
  $4.2($0.1MM)+$3.6($0.25MM)+$0.2($0.65MM)
- Option B – Increase both JAD and PME by $0.5MM
  Predicted Revenue Change = +$3.90MM
  $4.2($0.5MM)+$3.6($0.50MM)

Another scenario is to consider a budget increase of $1 million. In this example, we stay with an intermediate brand, but look at a brand launched during 1998-2000. Using the same approach as in the previous example, we again compare the choices of Product Manager A and B.

Product Manager A decides that DET expenditures should not be changed and allocates $0.1MM to JAD, $0.25MM to PME, while DTC receives the largest increase of $0.65MM. Multiplying the respective ROIs by the budget increase for each tactic yields a predicted revenue increase of $1.45MM, which could be a productive investment.

Product Manager B agrees that DET should stay the same and also thinks that the budget for DTC should not increase. The decision is made to allocate the budget increase in equal amounts of $0.5MM each to JAD and PME. The resulting predicted revenue change is $3.9MM. This allocation would be the more attractive choice.

Budget Scenario 3 – Reallocation of $1MM

Product Profile: $100-500MM, Launched 1998-2000

Average/Yr: DET=$20.5, DTC=$11.4MM, JAD=$1.9MM, PME=$5.1MM

- Option A – Reduce DTC by $1MM, add $0.5MM to JAD and PME, no change to DET

  Predicted Revenue Change = +$3.7MM

  $4.2($0.5MM)+$3.6($0.5MM)-$0.2($1.0MM)

- Option B – Reduce DTC by $1MM, add equally to DET, JAD and PME

  Predicted Revenue Change = +$2.7MM

  $4.2($0.33MM)+$3.6($0.33MM)+$2.1($0.34MM)-$0.2($1.0MM)

In this scenario the decision is to reduce the DTC budget by $1 million, and reallocate the funds to other major promotional tactics. Product Manager A decides to keep DET at the same level and divide the funds equally between JAD and PME. This yields a predicted revenue increase of $3.7 million, a very favorable increase.

Product Manager B decides to divide the $1 million reallocation equally between DET, JAD and PME. This results in a predicted revenue increase of $2.7 million, a favorable increase, but not as favorable as the one obtained by Product Manager A.

Hypertension Therapeutic Category (n=48)

	Average Revenue Impact (ROI)	Lower/ Upper Bounds
DET	$3.0	$2.8-$3.3
DTC	$0.1	$0.0-$0.2
JAD	$2.5	$1.9-$3.6
PME	$1.3	$1.1-$1.6

Brand Profiles

Revenue 12 = $25-100MM, 29 = $100-500MM, 7 = $500MM+

Launch 32 = <1994 , 13 = 1994-1997, 3 = 1998-2000

%DET/AVG$Kmo = 98%/$999, %DTC/AVG$Kmo = 17%/$104,

%JAD/AVG$Kmo = 71%/$162, %PME/AVG$Kmo = 71%/$162

PCP Fraction = 72%

Note: Lower and upper bounds represent 95% confidence, plus or minus two standard errors

For the 48 brands in the hypertension category, the estimated ROI is highest for DET, followed by JAD and PME. For both DET and JAD, the ROIs suggest that, on average, additional investments will provide positive returns.

The majority of brands in this therapeutic category were launched before 1994 and fall into the $100MM-$500MM cell. Almost all have allocated funds to DET, few have allocated funds to DTC, and 7 of 10 have invested in JAD and PME. The average monthly investments ranged from $999K per month for DET to $104K for DTC. This therapeutic category also has a high share of revenues generated by primary care physicians.

Asthma Therapeutic Category (n=20)

	Average Revenue Impact (ROI)	Lower/ Upper Bounds
DET	$ 1.4	$ 1.2-$ 1.8
DTC	$ 0.1	$ 0.0-$ 0.2
JAD	$15.6	$12.9-$20.8
PME	$ 0.7	$ 0.4-$ 1.2

Brand Profiles

Revenue 7 = $25-100MM, 11 = $100-500MM, 2 = $500MM+

Launch 12 = <1994, 7 = 1994-1997, 1 = 1998-2000

%DET/AVG$Kmo = 100%/$913, % DTC/AVG$Kmo = 30%/$713,

%JAD/AVG$Kmo = 85%/$70, %PME/AVG$Kmo = 100%/$166

PCP Fraction = 52%

Note: Lower and upper bounds represent 95% confidence, plus or minus two standard errors

For asthma, with 20 brands, we obtain by far the highest ROI for JAD. It is clear that the opportunity for JAD far exceeds that of any other instrument.

Looking at the brand profiles shows that most of these products were launched prior to 1998. And almost all had revenues of less than $500MM. All brands allocated funds to DET and PME, 85% to JAD and 30% to DTC. The highest average monthly expenditures were for DET at $913, followed reasonably closely by DTC at $713. PME and JAD, in particular, showed significantly lower monthly expenditures. This may, in part, explain the high ROI for JAD.

Arthritis Therapeutic Category (n=9)

	Average Revenue Impact (ROI)	Lower/ Upper Bounds
DET	$1.9	$1.7-$2.2
DTC	$0.1	$0.0-$0.2
JAD	$5.5	$4.3-$8.1
PME	$0.2	$0.0-$0.7

Brand Profiles

Revenue 0 = $25-100MM, 6 = $100-$500MM , 3 = $500MM+

Launch 5 = <1994, 1 = 1994-1997, 3 = 1998-2000

%DET/AVG$Kmo = 100%/$3123, %DTC/AVG$Kmo = 56%/$1166,

%JAD/AVG$Kmo = 100%/$156, %PME/AVG$Kmo = 100%/$421

PCP Fraction = 56%

Note: Lower and upper bounds represent 95% confidence, plus or minus two standard errors

For arthritis, with 9 brands, we again observe an especially strong ROI for JAD. But the difference from the other instruments is not as great as it is for asthma. Apart from JAD, there appears to be a modest opportunity to invest in DET while both PME and DTC receive excessive investments.

The brand profiles differ greatly from Hypertension and Asthma. Many of these brands were launched after 1994 and three have revenues of $500MM or more. All of the brands allocated funds to DET, JAD and PME. Over half of the brands allocated funds to DTC. The average monthly expenditures in descending order are DET, DTC, PME and JAD.

Similarity in Launch Date Dependence – ROIs and % Revenues in DET

	DET/REV	ROI
$500MM+		
1998-2000	12.6%	$11.6
<1994	3.9%	$ 3.1
$25-100MM		
1998-2000	30.0%	$1.0
<1994	3.0%	$0.9

It is useful to speculate about possible reasons for the strong dependence of ROI on the launch date for the large brands and its absence for the small brands. To examine this, we show the percent of revenue allocated to detailing expenditures for four of the brand cells and the corresponding ROIs. Why is it that for large brands the ROI is far larger for the most recently launched brands ($11.6) than for the earliest brands ($3.1)? This is particularly interesting because we do not observe the same tendency for small brands. It is clear that detailing expenditures, in fact, decline over time, for both large and small brands. But the reduction is far more dramatic for small brands than for large ones. For large brands, the ratio of the two percentages (12.6/3.9) is slightly above 3 while for small brands this ratio (30/3) is 10.

For small brands the ROI is 1 or close to 1 which suggests, as mentioned earlier in the presentation, that there would not be positive returns for additional investments in DET. Although there may be other explanations for the launch date dependence being much higher for large than for small brands, the data are consistent with the idea that the percent of revenues allocated to DET should be increased especially for newer products. Of course, for large brands DET offers positive returns for all launch dates. But even if total brand expenditures stay the same, the return should increase greatly if the newest brands receive more support.

Similarity in Launch Date Dependence – ROIs and %Revenues in JAD

	JAD/REV	ROI
$500MM+		
1998-2000	1.0%	$12.2
<1994	0.3%	$ 3.1
$25-100MM		
1998-2000	3.8%	$7.2
<1994	0.3%	$6.2

It is quite interesting to note that there is a similar pattern for JAD as there is for DET. First, note that the dependency in ROIs on launch date is proportionally the same for large brands for the two tactics. For small brands the ROIs are very close to each other, but all are much higher for the small brands than DET. So just as for DET, we see that the ratio of ROIs is almost 4 for large brands (12.2/3.1) and close to 1 for small brands (7.2/6.2). But just as for DET we see that the ratio of the two percentages, JAD/REV, is above 3 for large brands (1.0/0.3), while for small brands it is greater than 10 (3.8/0.3). One could raise the expenditures on JAD for new brands quite a bit, thereby also raising the percent of revenues allocated to JAD for the newest brands, with the expectation that there will be a very positive return. Of course, since the ROIs for all small brand JAD are high, raising the expenditures on JAD for small brands independent of the launch date should also be profitable.

ARPP Summary Observations

Assuming zero marginal costs of production, the estimated effects of marketing expenditures should be close to 1

- Large brands ($500MM+) all exceed 1, except DTC <1994 and DTC 1994-1997
- Medium brands ($100-$500MM) all exceed 1 and closer to 1, except DTC
- Small brands ($25-$100MM) JAD far greater than 1, DET very close to 1, PME and DTC close to 0

These observations suggest:

- Most promising return targets for additional resources are PME, DET and JAD for large brands ($500MM+) launched after 1997
- DTC provides its best returns for large brands launched from 1998-2000
- Additional resources allocated to JAD for small brands ($25-100MM), in addition to large brands, could provide very positive returns

In conclusion, the estimated effects of additional allocations of marketing expenditures to a promotion tactic provide positive returns if the ROI exceeds 1. For large brands, revenues greater than $500MM, all the ROIs are above 1 except for DTC, whose ROI exceeds 1 only for the newer brands. Although the ROIs for intermediate brands exceed 1, they are closer to 1 than is true for large brands. Again, the exception is DTC. For the small brands, only JAD has an average ROI greater than 1.

What are the implications of these observations? It appears that for recently launched large brands, $500MM+, consideration should be given to allocating additional resources to PME, DET and JAD. On the other hand, if budget reductions are mandated, the ROIs reported here provide useful guidance to minimize the impact on revenues. And if the budgets are to stay the same, reallocations based on the ROIs can produce profitable results.

DTC, based on these results, expressed as ROI for the average brand, appears to provide its best return for large brands launched recently. For small brands, additional allocations to JAD should provide very positive returns.

We now move to the second part of the program for this afternoon: a discussion of the study results by the Steering Committee members whose guidance and observations have been very helpful during the course of this study.

Steering Committee Discussion of ARPP Results

Steering Committee Participants

- Bill Friedrich – Wyeth-Ayerst Global Pharmaceuticals
- Kevin Kirby – GlaxoSmithKline (unable to attend)
- Paul Rabideau – Novartis Pharmaceuticals Corp.
- Dean Slack – Bayer Corp.
- C. Marshall Paul – ACNielsenHCI
- Kelly Sborlini – Verispan

NOTES

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Definition of Terms

Data from Scott-Levin:

Source™ Prescription Audit

Retail Sales: expressed in dollars, it is the full price the pharmacy charges a consumer, regardless of any co-pay situations

Retail Prescriptions: identified as new, refill, or the combination of both, are products dispensed in retail pharmacies

Average Retail Price: on average, the retail price per prescription. This calculation is based on retail sales and prescriptions

Personal Selling Audit/Hospital Personal Selling Audit

Details: each product discussed during a sales call. A call is defined as a face-to-face meeting between a pharmaceutical rep and a physician (or group of physicians)

Detail Dollars: based on the average cost of a sales call, including fixed costs associated with keeping a rep in the field (salary, car allowance, travel, bonus, etc), but none of the variable costs (samples, marketing materials, etc). The average estimated cost of an office-based physician call is $142, and for hospital-based physicians, $179, for 2000. Each year, this estimated cost is adjusted for the CPI (consumer price index)

Direct-to-Consumer Audit

DTC Media Types: there are 11 different media types that are tracked: magazine, Sunday magazine, outdoor, national newspaper, network TV, national spot radio, cable TV, syndicated TV, spot TV, network radio, newspaper

Physician Meeting & Event Audit

Event Types & Dollars: events are classified as one of the following:

Videoconference: if videoconference was a medium used. The price attributed to a videoconference is $2,500

Teleconference: if teleconference was a medium used - $2,500

All Other: focus groups or personal interviews - $2,500

Third Party: conducted by a moderator - $5,000

Symposium: 51 or more attendees, or takes place at a convention, or lasts longer than 4 hours - $50,000

Large Group: between 21 and 50 attendees, or lasts longer than 2 hours - $50,000

Small Rep: led by a pharmaceutical representative, and has 20 or fewer attendees - $5,000

Small Group: takes place in a restaurant (ie, dinner meeting), led by a non-pharmaceutical representative (ie, physician) - $5,000

Data from PERQ/HCI:

Journal Ad Review (JAR)

Journal Dollars: a measure of pharmaceutical product placement and expenditures for advertisements placed in medical journal and tabloid publications. The Dollar calculation is based on the specific advertising unit at the 48 times Black & White rate and the 48 times Color rate (if applicable)

Estimation is done **separately for each of three revenue types**

Model

$$\ln S_{it} = a_i + a_i' t + a_i'' t^2 + a_i''' t^3 + g \ell_n P_{it}$$
$$+ b_1 JAD_{it} + b_2 PME_{it} + b_3 DET_{it} + b_4 DTC_{it}$$
$$+ b_5(JAD * T) + b_6(PME * T) + b_7(DET * T) + b_8(DTC * T)$$
$$+ b_9(JAD * PME) + b_{10}(JAD * DET) + b_{11}(JAD * DTC)$$
$$+ b_{12}(PME * DET) + b_{13}(PME * DTC) + b_{14}(DET * DTC)$$
$$+ b_{15}CJAD + b_{16}CPME + b_{17}CDET + b_{18}CDTC + u_{it}$$

where:

S_{it} is unit sales of brand i in month t in thousands of units

t is 1,…,72

P_{it} is average price of brand i in month t in dollars

JAD_{it} is an exponentially declining weighted sum of current and past medical journal advertising expenditures for brand i in month t in thousands of dollars

PME_{it} is weighted sum of physician meetings and events (brand i, month t, $000)

DET_{it} is weighted sum of detailing (brand i, month t, $000)

DTC_{it} is weighted sum of direct-to-consumer marketing (brand i, month t, $000)

T = 0 if <1994, 1 if 1995-98, 2 if >1998

$CJAD_{it}$ is competing brands' JAD (month t, $000)

$CPME_{it}$ is competing brands' PME (month t, $000)

$CDET_{it}$ is competing brands' DET (month t, $000)

$CDTC_{it}$ is competing brands' DTC (month t, $000)

u_{it} is a disturbance term.

DICK R. WITTINK
YALE SCHOOL OF MANAGEMENT

Dick Wittink is the General George Rogers Clark Professor of Management and Marketing at the Yale School of Management. He is also Professor of Marketing and Market Research at the University of Groningen in the Netherlands.

Wittink is an expert in customer-focused marketing strategies, customer preference measurement, customer satisfaction and loyalty, and model building for marketing decisions. He has more than 100 publications, is an area editor of *Marketing Science* and editorial board member of the *Journal of Marketing Research* and of the *International Journal of Research in Marketing*. His coauthored paper "Competitive Reaction versus Consumer Response: Do Managers Overreact?" won the best paper award of articles published in the *International Journal of Research in Marketing* in 1996. Another coauthored paper "Building Models for Marketing Decisions: Past, Present and Future" won the best paper award at the same journal in 2000. His book, *Building Models for Marketing Decisions*, with Leeflang, Wedel and Naert, was published by Kluwer in 2000. He was elected to the Royal Dutch Academy of Sciences in 2001.

Wittink has been involved in many executive education programs at Cornell University, Stanford University, Yale University, the Wharton School of the University of Pennsylvania, the University of Groningen and at various firms. His consulting clients include or have included AC Nielsen, Bain and Co., British Telecom, Johnson Wax, Miller Brewing Company and Xerox. He is a co-founder and partner of Blue Flame Data, Inc. in New York City and academic trustee of the Marketing Science Institute in Cambridge, Massachusetts.

Acknowledgments

RAPP Steering Committee

We would like to acknowledge the time and efforts of the Steering Committee members, an independent group, in the development and completion of the Analysis of ROI for Pharmaceutical Promotion (ARPP) study. The Steering Committee Members are as follows:

Bill Friedrich
Associate Director, Global Market Research
Wyeth-Ayerst Global Pharmaceuticals
Philadelphia, PA
President, Pharmaceutical Marketing Research Group

Kevin Kirby
Manager of Promotion Response and Targeting
GlaxoSmithKline
Research Triangle Park, NC
Treasurer, Pharmaceutical Management Science Association

Paul Rabideau
Director, Marketing Science
Novartis Pharmaceutical Corp.
East Hanover, NJ
Past President, Pharmaceutical Management Science Association

Dean Slack
Director, Strategic Analysis
Bayer Corp.
West Haven, CT
Treasurer, Pharmaceutical Science Marketing Group

Dick Wittink, PhD
General George Rogers Clark Professor of Management and Marketing
Yale School of Management
New Haven, CT

C. Marshall Paul
President
ACNielsenHCI
Princeton, NJ

Kelly Sborlini
Director, Audit Services
Verispan
Newton, PA

Art Mahoney
President
Bay Head Consulting Group
Bay Head, NJ

Kenneth Sylvia
Chief Operating Officer
The Clinicians Group
Clifton, NJ
Board of Directors, Association of Medical Publications

Consultant to the Steering Committee

Scott A. Neslin
Albert Wesley Frey Professor of Marketing
Amos Tuck School of Business
Dartmouth College
Hanover, NH

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Phone: (908) 233-8147 • Fax: (908) 233-8305
email: amp-office@att.net • www.amponline.org

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