
Division of Labor in Medical Office Practices

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Traditional work structures

- Specialized division of labor - Assumed to lead to higher productivity at the narrowly defined tasks.
- Consolidation of tasks - Reduces waste from communication during handoffs between process stages and set-ups, as well as blocking and starving that occurs in stochastic series systems.



OR



Delegation

- A form of division of labor, typical in professional services.
- When a task that one, usually higher skilled, worker can do, is assigned to a lower skilled worker.
 - Hierarchical in skill and costs.
 - Often assign tasks to the lowest cost worker that can perform it.

Delegation in Medical Practices

Physicians are advised to:

“delegate all duties that don’t require a physician’s license,”

with the explanation that:

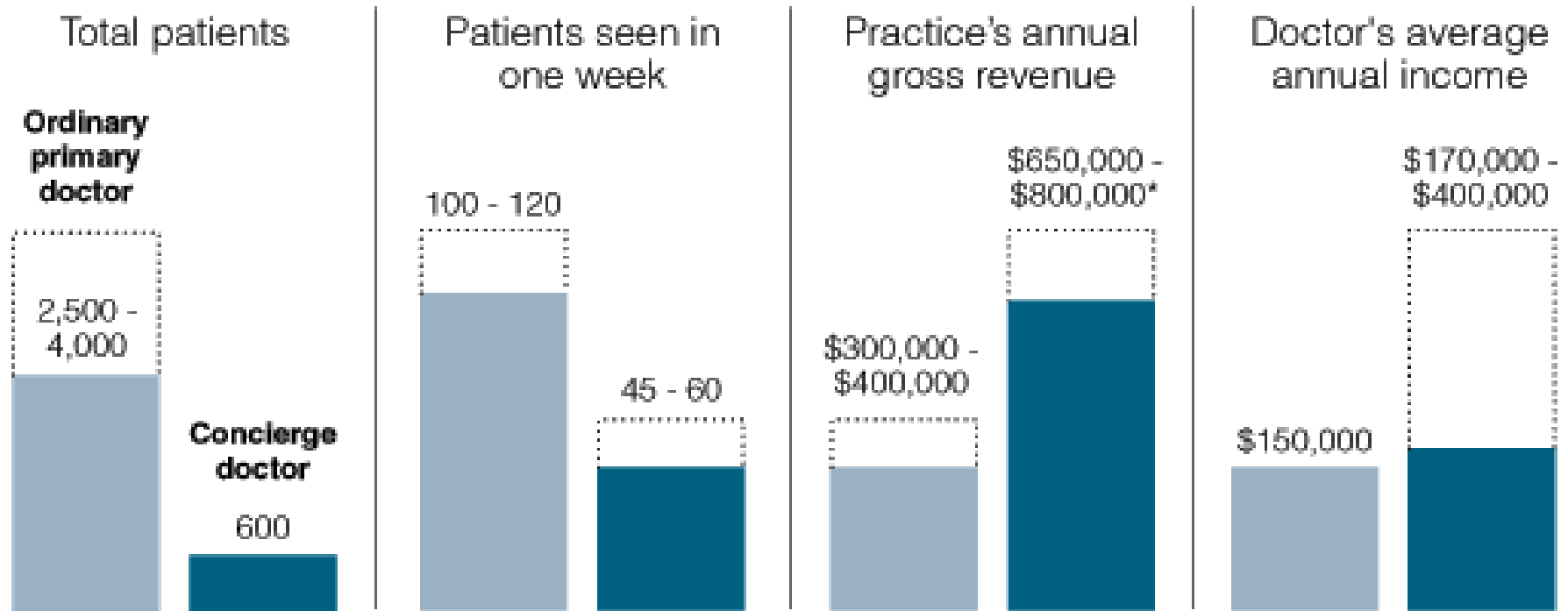
“even if you have to hire an extra staffer or increase a part-timer's hours to handle the extra workload, the increase in your own productivity should offset the higher personnel cost.”

Standard Office Practice

	<u>Standard</u>	<u>Dr. Lean</u>
• Support Staff:	RN, Sec., NP, Practice Manager	No Staff
• Office Space:	2-3K sq. ft.	150 sq. ft.
• Length of Visit:	10-20 minutes	30 minutes
• Access:	Days for appointment Weeks for physical	Same day

Bedside Manner, for a Price

Patients who can afford more medical attention can pay a retainer fee to concierge doctors, who will be available at a moment's notice.



*Includes concierge fees retained by the practice and medical fees paid by insurers.

Source: Medical Economics magazine; MDVIP; General Accounting Office survey

From *New York Times*

Theoretical Model

- Decision maker: Physician
- Objective: Maximize income
- Decision variables:
 - Number of support staff of each kind.
 - Allocation of work among staff.
 - Number of visits to “process” per year. (related to panel size)

Decision variables

- y_j number of providers of type j (FTE's)
- x_{ij} fraction of work that is of type i done by j (only defined for $i \leq j$)
 - Work and workers organized in a hierarchy
 - Doctor is highest level, n .
 - Lowest level is secretary, 1 .
 - Each worker of type j is assumed qualified to do all the work of types $i \leq j$.
- v number of patient visits seen per year.

Model Inputs

- T_i base work time for providing care for a visit that provider i is qualified for but provider $i-1$ is not qualified for
- S_j the setup time for provider j (for each visit)
- I_j the interaction time that provider type j incurs with all other providers per visit
- D_j provider j work hours/year (2000 hours)
- c_j provider j total costs/year (\$21K secretary, \$30K nurse)
- p revenue/visit (\$55 per visit)

Formulation


$$\text{Max}_{x_{ij}, y_j, v} \quad pv - \sum_{j=1}^{n-1} c_j y_j - \sum_{j=1}^{n-1} r_j y_j - r_n$$

$$\text{Subject to: } \sum_j x_{ij} = 1 \quad \forall i \quad (1)$$

$$\sum_{i=1}^j T_i x_{ij} + S_j + I_j \left(\sum_{i=1}^{n-1} y_i \right) \leq \frac{D_j}{v} y_j \quad \forall j \quad (2)$$

$$x_{ij} \geq 0, y_j \geq 0 \quad \forall i, j \quad (3)$$

$$y_n = F_n \quad (4)$$

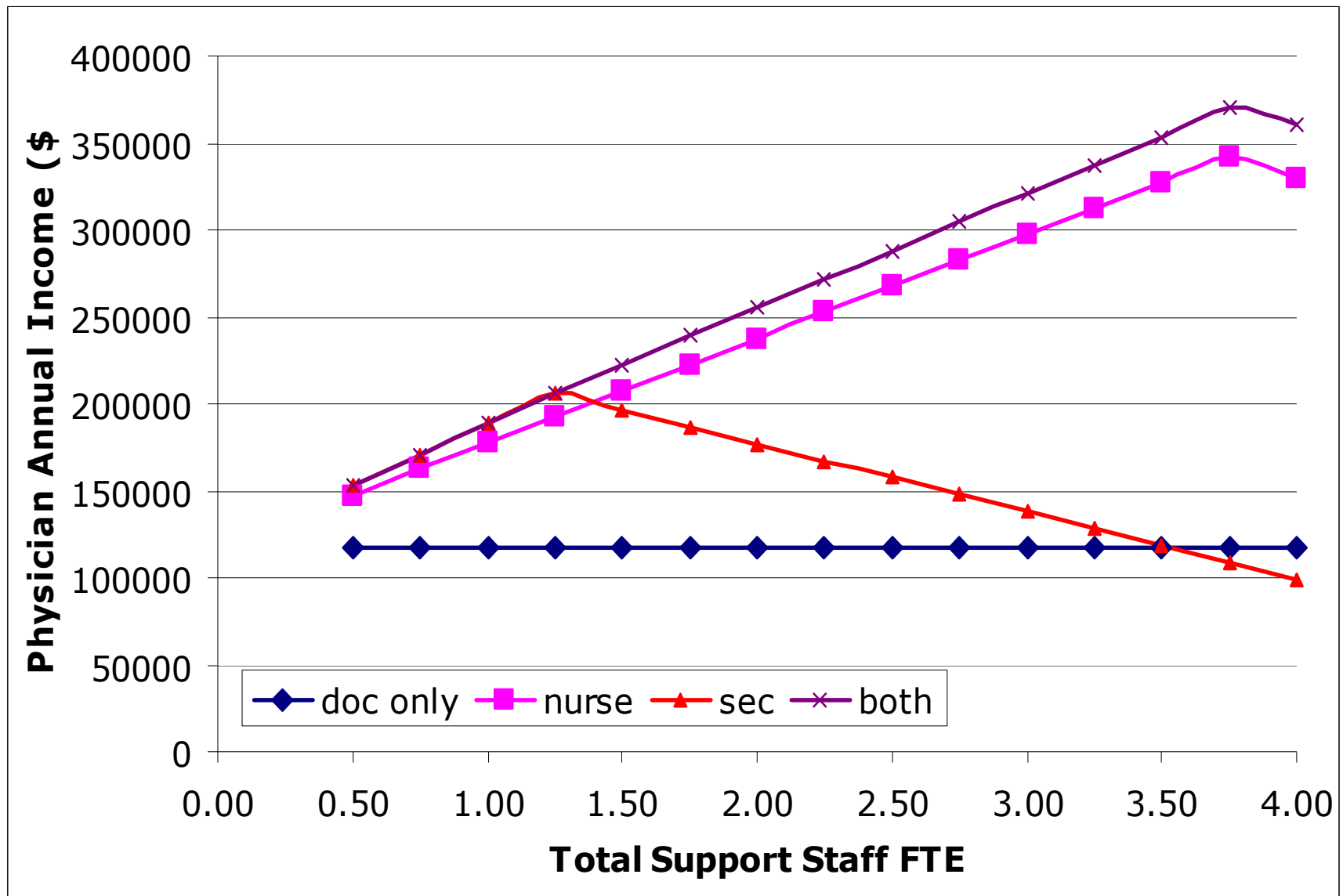


Hours of
Type j staff
Available per
Visit.

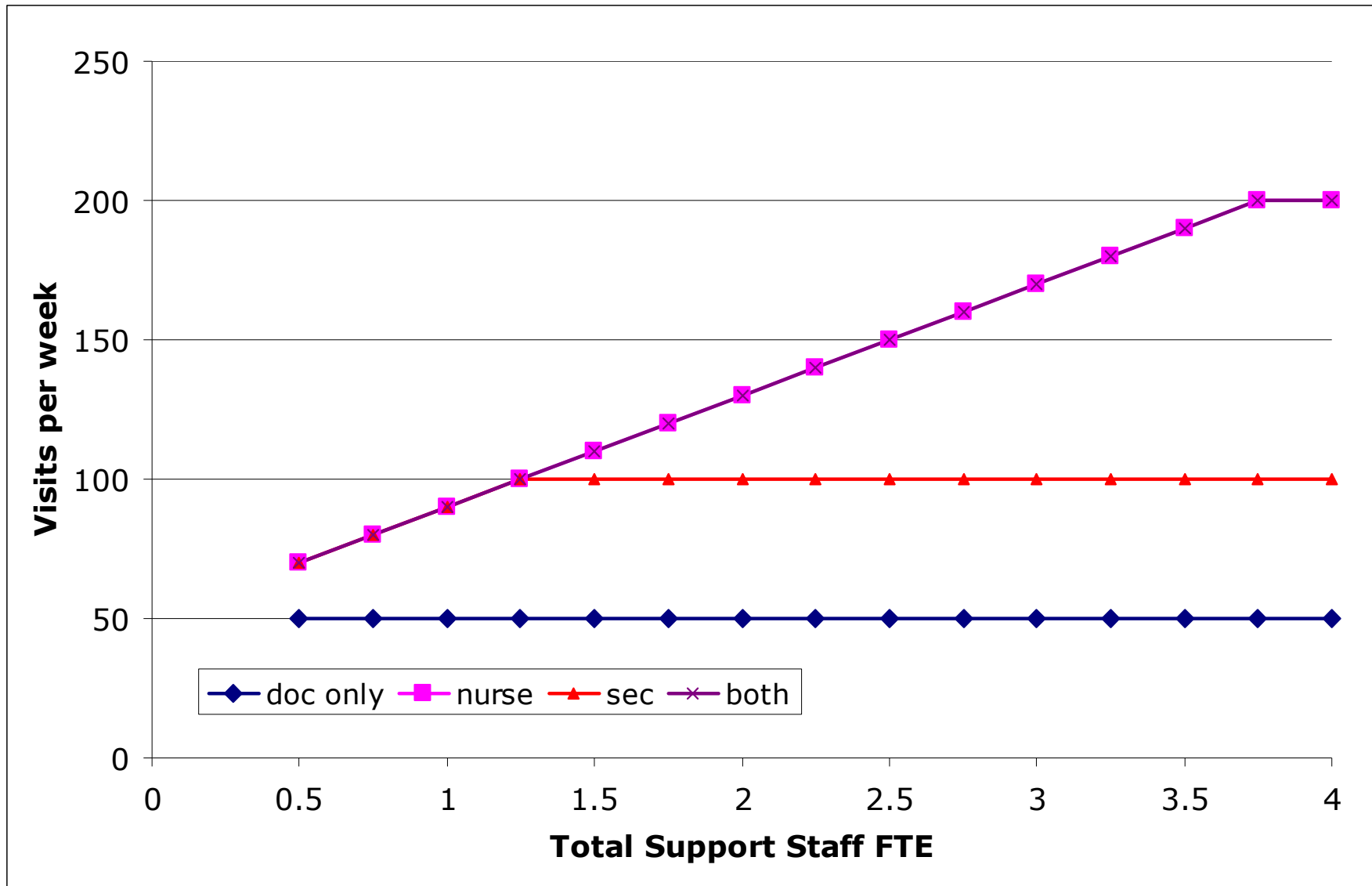
Numerical Experiments

- Only considered Sec and RN staffing (2000 hrs/year).
- Fixed Doctor at 2500 hrs/year.
- Parameter values:
 - $T_{\text{sec}} = 30$ min, $T_{\text{RN}} = 15$ min, $T_{\text{Doc}} = 15$ min

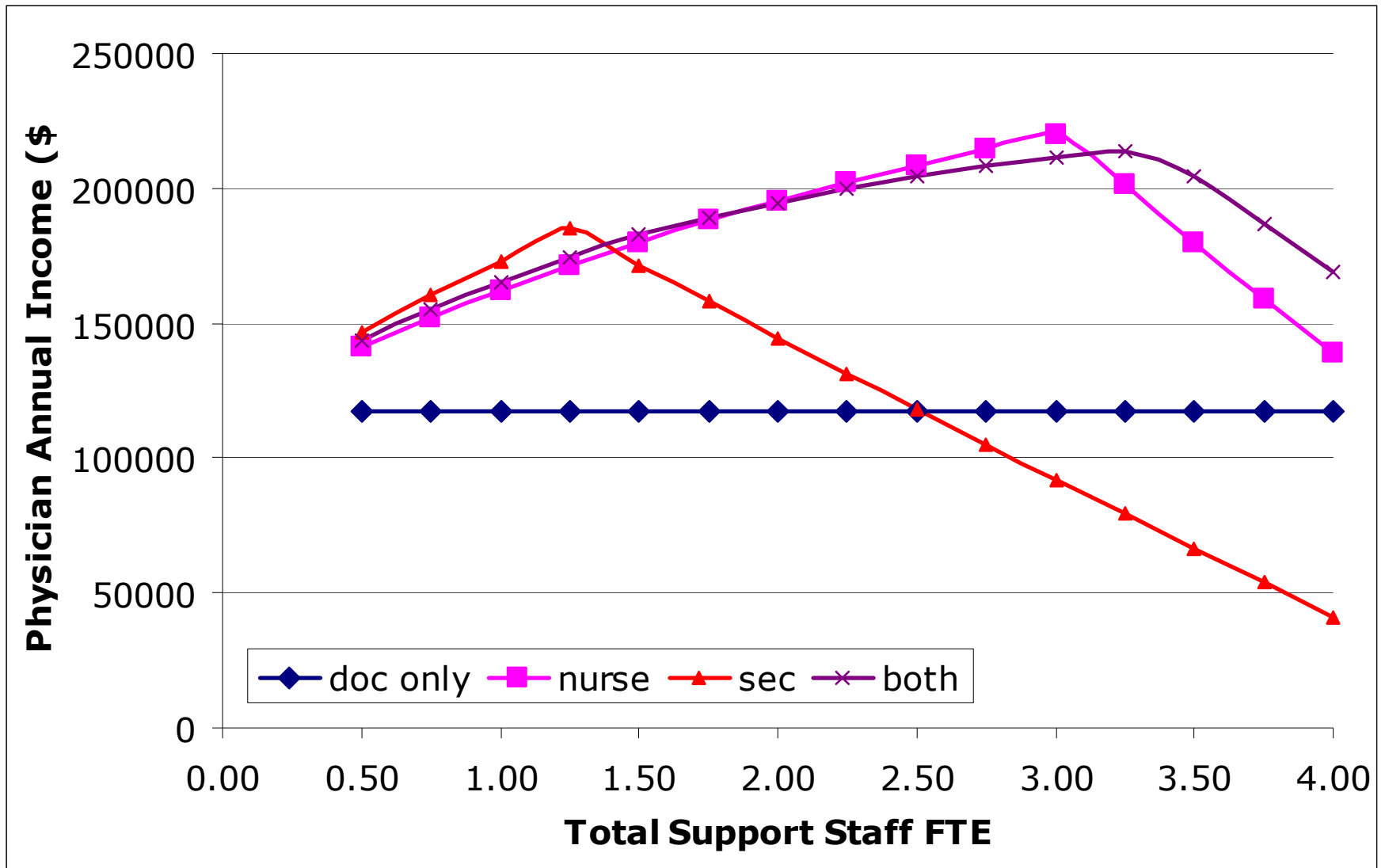
MD Annual income with I, S = 0



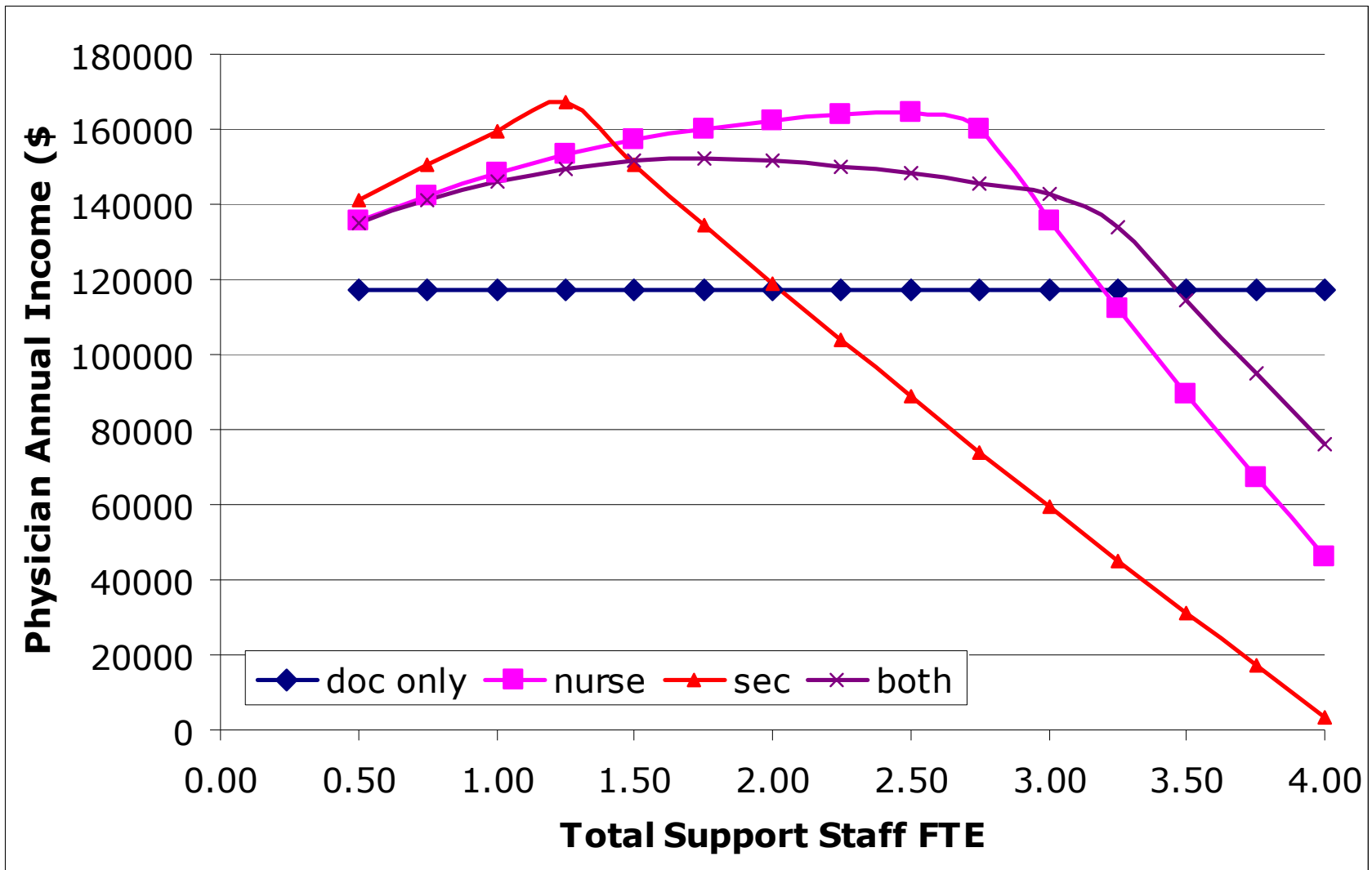
Patient visits per week with I,S = 0



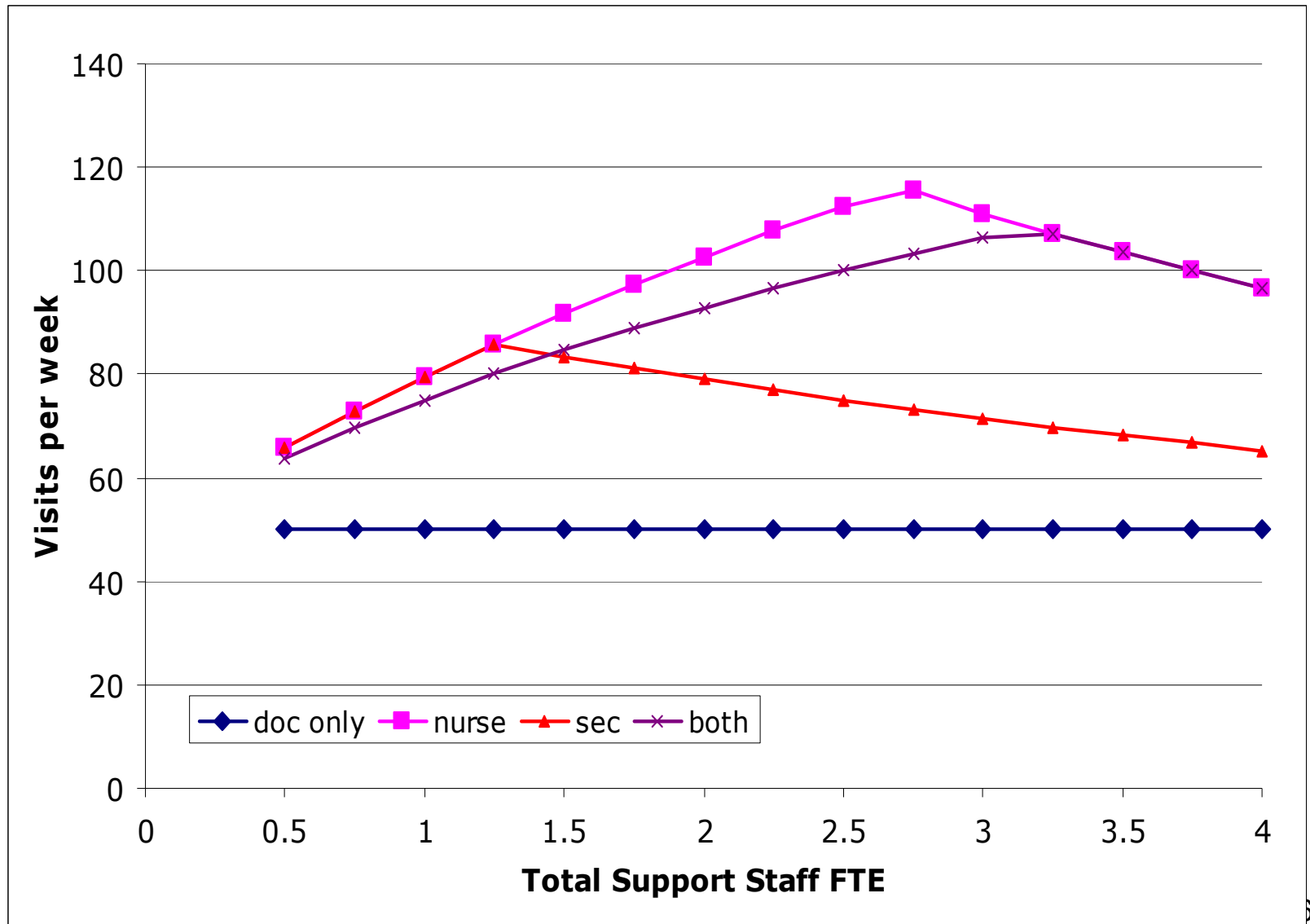
MD Annual income with $S=0$, $I = 2$



MD Income with $S = 0, I = 4$



Patient visits per week with $S = 0, I = 4$



Summary of Observations from Model

- More staff increases office visits seen.
- More staff types leads to fewer visits for fixed number of staff.
- Interaction time flattens income curve
 - Reduces value of additional visits.
 - Many staffing configurations lead to similar financial outcomes.

Hypotheses for empirical analysis

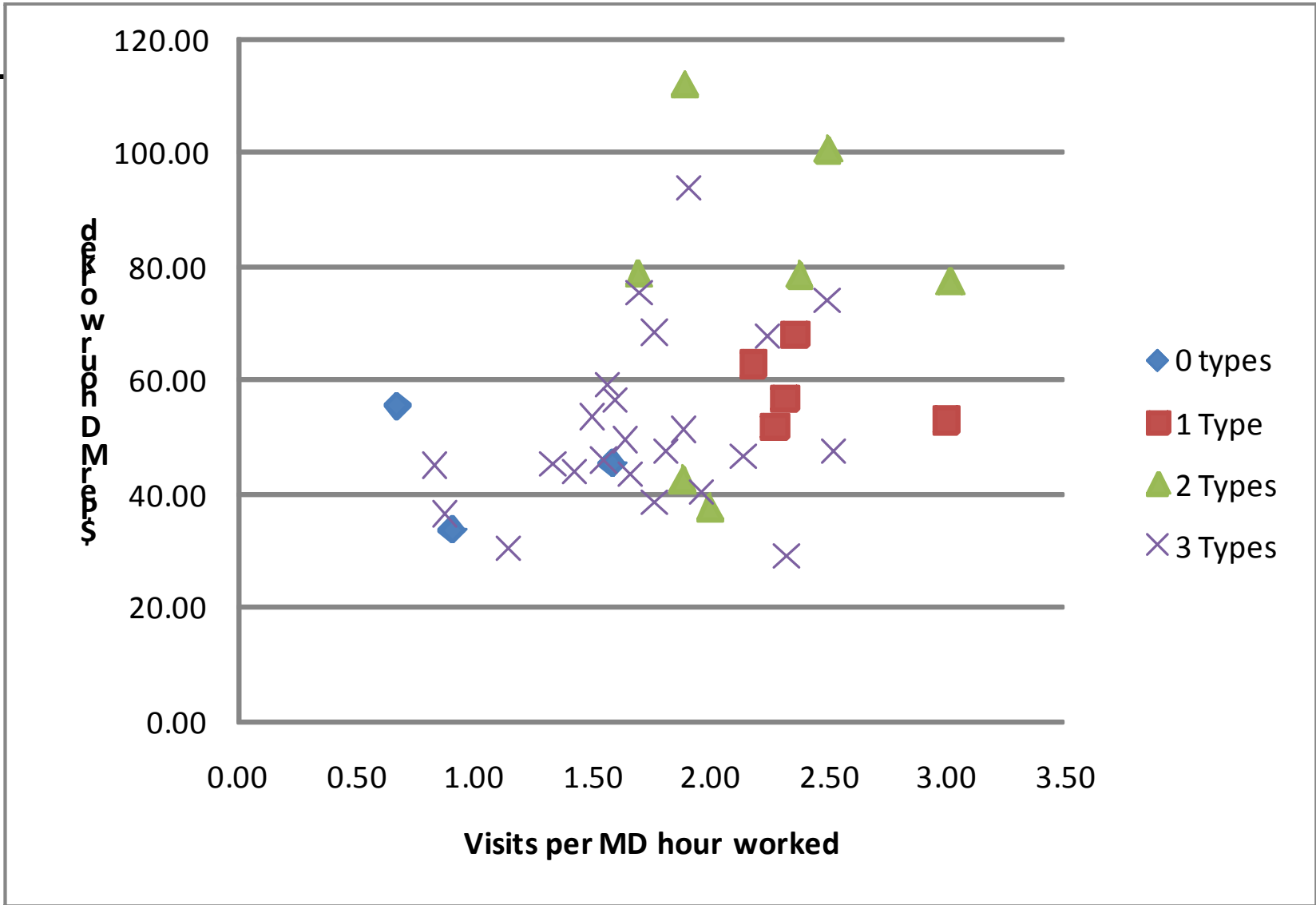
- H1: Controlling for staff size, greater delegation through the use of more staff types will decrease the number of visits a practice can process per unit time.
- H2: Controlling for staff size, the income per unit time generated by the practice is decreasing in the number of staff types.

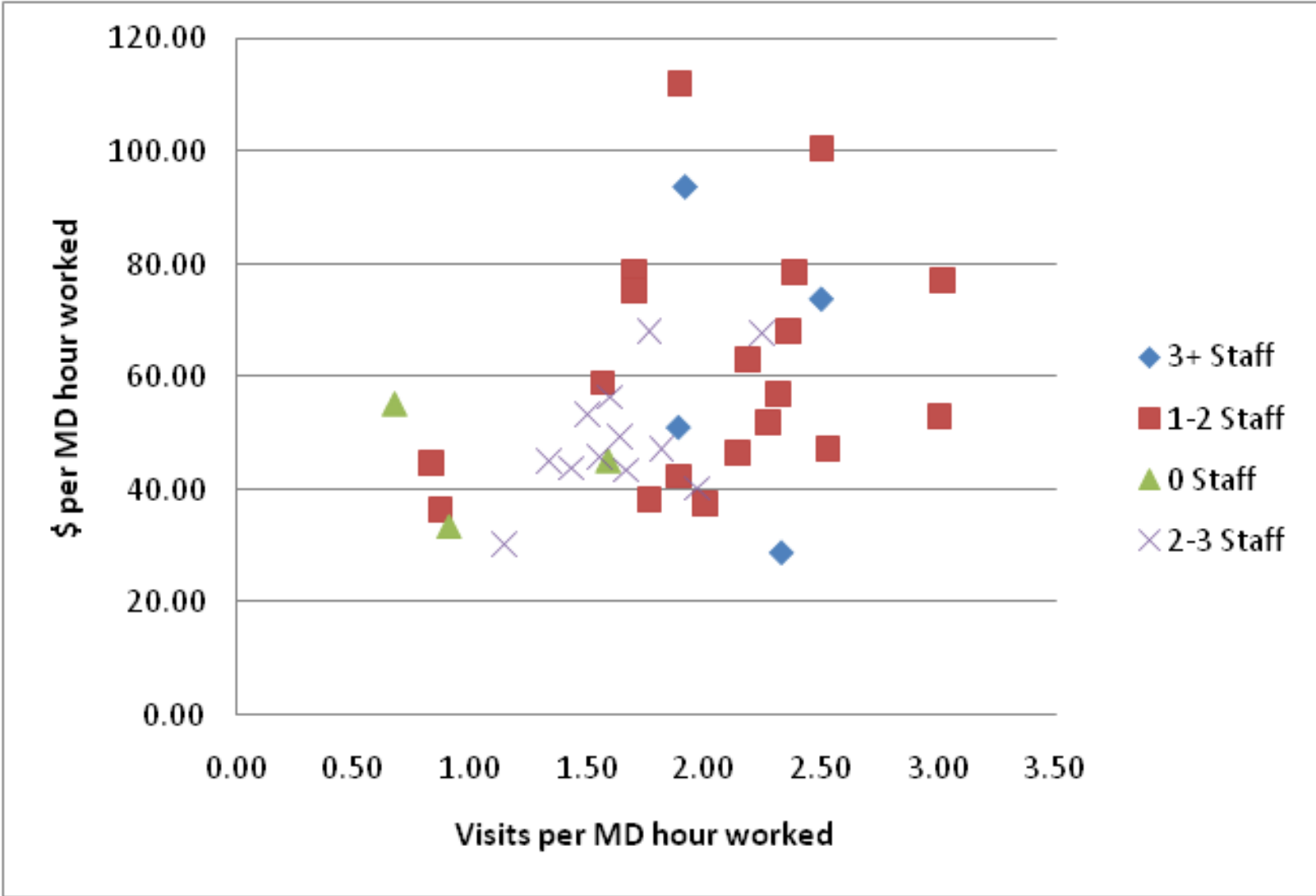
Data Set

- Surveyed the internal medicine and family practice doctors in the Rochester, NY metropolitan area.
 - Approximately 90 useful responses out of 500 doctors.
 - Eliminating outliers, reduced to 61 data points
- Questions on practice operations:
 - Patient volume, staffing, work hours etc., waiting times
- Questions on financials:
 - Income, salaries, overhead costs
- Questions on work structure:
 - Allocation of tasks, use of information technology
- Demographics:
 - Doctor, patients

Descriptive Statistics

Measure					
Percentage of practices with an Office Manager	79%				
Percentage of practices with a mid-level Provider	52%				
	Mean	Median	Standard Deviation	Min	Max
Patient panel size	2639	2200	1558	500	4500
Number of support staff types	2.45	3	.85	0	3
Number of support staff per provider	1.93	1.8	.9	0	5
Physician hours worked per week	51.75	51.5	11.78	23.25	85
Visits processed per week	93.5	90	29.56	20	170
Physician annual net pre-tax income	\$146K	\$130K	\$51K	\$70K	\$290K
Physician net pre-tax income per hour worked	\$60	\$55.56	\$18	\$29	\$112
Patient visits per hour of physician labor	1.85	1.76	.53	.68	3.13
Total minutes of labor time per patient visit	81	78	26	34	153





Regression Equations

$$V_j = \theta_0 G_j^{\theta_1} A_j^{\theta_2} e^{\theta_3 i_{sj}} L_j^{\theta_4} M_j^{\theta_5} e^{Z_1 R_j} e^{Z_2 U_j} e^{\varepsilon_j}$$

$$\pi_j = \beta_0 G_j^{\beta_1} A_j^{\beta_2} e^{\beta_3 i_{sj}} L_j^{\beta_4} M_j^{\beta_5} e^{Z_1 R_j} e^{Z_2 U_j} e^{\varepsilon_j}$$

Log Visit per Week	Model 1	Model 2	Model 3
θ_0 Intercept	-0.506 (0.587)	-0.609 (0.509)	-0.801 (.421)
θ_1 Log % Medicare & Medicaid	0.035	0.039	0.034
θ_2 Log Average Patient Age	0.254	0.263	0.227
θ_3 Self-employed (0/1)	0.040 (0.658)	0.042 (0.639)	0.043 (.642)
θ_4 Log Number of Staff / MD (include MD)	0.291 * (0.075)	0.276 * (0.065)	0.307 * (.085)
θ_5 Log Number of Staff Types (include MD)	-0.281 * (0.074)		
θ_6 #Types Greater than two (include MD)		-0.316 ** (0.038)	
τ_1 # Types = 1			0.394 (.163)
τ_2 # Types = 2			0.289 * (.092)
τ_3 # Types = 3			-0.040 (.760)
<i>Observations (R-square)</i>	61 (0.10)	61 (0.12)	61 (0.12)

Log Income/Hour of Work	Model 1	Model 2	Model 3	Model 4
Constant β_0	3.5496 *** (.0002)	3.6232 *** (<.0001)	3.5494 *** (<.0001)	3.6623 *** (<.0001)
Log Avg. Patient Age β_1 Log % Medicare/caid β_2	0.1423 -0.0294	0.1549 -0.0331	0.1680 -0.0303	0.0645 -0.0410
Self-employed β_3	-0.1697 * (.0531)	-0.1651 * (.0578)	-0.1618 * (.0567)	-0.1608 * (.0565)
Log # of Staff/MD β_4 (include MD)	0.1505 (.2054)	0.2842 * (.0650)	0.3138 ** (.0249)	0.3505 ** (.0314)
Log # Staff Types β_5 (include MD)		-0.2025 (.1689)		
#Types Greater than two (include MD) β_6			-0.3020 ** (.0332)	
τ_1 # Types = 1				0.3819 (.1360)
τ_2 # Types = 2				0.2610 * (.0927)
τ_3 # Types = 3				-0.1953 (.1033)
R-Square	0.12	0.15	0.19	0.23

Summary of results

- Empirical evidence that for internal medicine office practices
 - “Complexity” of staff structure and work processes introduce interaction inefficiency into operations.
 - Staff complexity inefficiency dominates benefits from division of labor.
 - Lower intensity, smaller practices are viable if not preferred.
- These choices have implications for patient experience
- These choices have implications for healthcare labor market.

Conclusion and open questions

- Small inefficiencies destroy benefits of high volume.
 - What is behind these inefficiencies?
 - Why are some large practices very successful?
- What happens when work hierarchy (T_i) changes?
 - Effect of productivity tools.