TEXASLAW

Irrational Ignorance at the Patent Office

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Motivation

- There is growing concern the Patent Office is issuing too many invalid patents
- Invest more resources in the Patent Office or rely upon courts
- Investment in Patent Office → Patent examiner time allocations

Patent Examination

- 300,000 to 500,000 patent applications filed at Patent Office a year

- Patent applications filed with the PTO are routed to an Art Unit, wherein the application is largely randomly assigned to a specific examiner.

Time Allocations

- Examiners, on average, spend 19 hours reviewing a patent application
- Patent applications are presumed valid
- Anecdotal evidence
  - "*when you add it up its not enough time to do a proper job on a case*"
  - *"rather than doing what I feel is ultimately right, I'm essentially fighting for my life"*

The Manhattan Strategy Group, Patent Examiners Production Expectancy Goals Re-Assessment and Adjustment Study (2010)

Methodology/Data

- Examination time decreases upon certain types of examiner promotions

Examination Hours Allocated to Examiner as a Function of GS-level

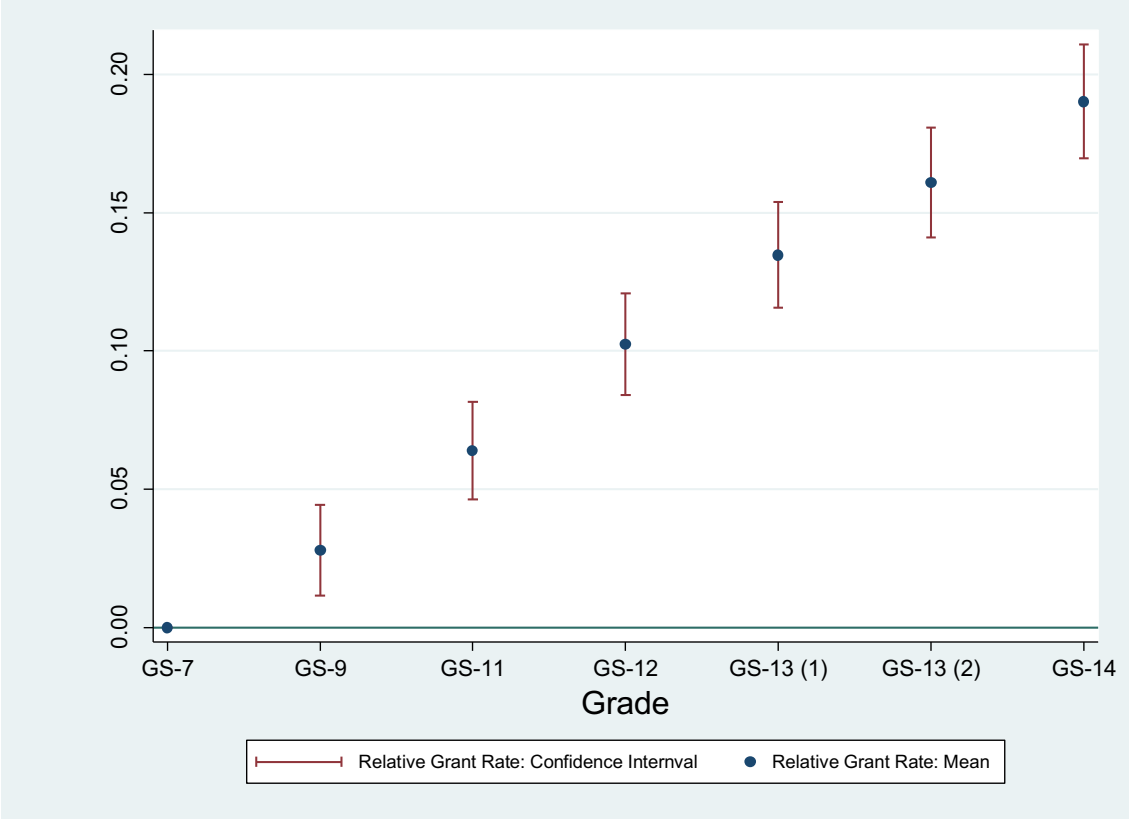
GS-level	Compound Tools	Artificial Intelligence
GS-7	19.7	45.1
GS-9	17.3	39.5
GS-11	15.3	35.1
GS-12	13.8	31.6
GS-13	12.0	27.5
GS-13, partial signatory	11.0	25.3
GS-14	10.2	23.4

Methodology/Data

- Examiner-fixed-effects design
  - year fixed effects
  - examiner experience fixed effects
  - technology by year fixed effects
  - various characteristics of individual application
- Collected data on all 3.9 million utility patent applications from PAIR from 2001-2017
- FOIA the PTO for annual roster indicating the GS-level and experience

Results

Figure 1: Relationship between Examiner GS Level and Grant Rate



Michael D. Frakes and Melissa F. Wasserman, *Is the Time Allocated to Review Patent Applications Inducing Examiners To Grant Invalid Patents?: Evidence from Micro-Level Application Data*, 99 REVIEW OF ECONOMICS & STATISTICS 550 (2017).

Implications

- So, evidence is consistent with examiner time allocation causes the Agency to issue patents of dubious quality.
- Should we then increase time allocations? Not so fast…

Patent Office "Rationally Ignorant"

- Mark Lemley, *Rational Ignorance at the Patent Office*, 95 NW. L. REV. 1 (2001)

Costs associated with doubling examiner time allocations	>>	Social benefits gained by resulting decrease number of invalid patents issued

  - Lemley guessed key relationships such as how many fewer patents would the Agency issue if examiner time allocations were doubled which were determinant of his conclusion.

Cost-Benefit Analysis of Patent Office v. Courts/PTAB

Spend 1 dollar increasing resources at the Agency

Do we get more than 1 dollar in benefits associated with allowing fewer invalid patents ?

Cost-Benefits Analysis

Costs	Benefits
Personnel Expenses to the Patent Office	Litigation Savings
Potential Increase Attorney Fees?	Invalid Patents Impede Follow-on Innovation
	Invalid Patents Can Cause Supra Competitive Pricing and Decrease Access
	Non-Practicing Entities Can Utilize Invalid Patents to Extract Rents from Innovators
	Transactions Costs Associated with Licensing Invalid Patents
	Invalid Patents Can Impede Competitors from Entering the Market

The Costs: Increase Personal Expenses to the Patent Office

Simulated Increase in Payroll Expenses Associated with Doubling the Number of Hours Allocated to Examiners

GS-level	Number of Annual Dispositions by Examiners	Mean Number of Hours Assigned	Total Additional Hours after Doubling Hours per Application	Examiner Cost Per Hour (Salary, Benefits and Other Costs)	Extra Costs when Doubling Examination Hours
GS-5	237	36.3	8,603.1	$31.41	$270,200.38
GS-7	3,244	28.7	93,102.8	$38.90	$3,621,324.72
GS-9	9,870	26.0	256.620	$47.57	$12,207,762.40
GS-11	20,770	23.5	488,095	$57.58	$28,102,895.09
GS-12	41,825	21.5	899,237.5	$68.99	$62,041,828.05
GS-13	85,747	18.2	1,560,595	$82.05	$128,043,431.70
GS-14	254,931	16.3	4,155,375	$96.96	$402,920,693.60
GS-15	12,432	16.5	205,128	$114.05	$23,394,540.54
Total	430,056	17.9	7,666,757	$76.58	**$660,602,676.60**

Changes in Patent Prosecution (Attorney) Expenses

- Greater examination time:
  - Possibly greater attorney fees per round of review (to respond to stronger examiner rejections) but
  - Possibly less back and forth between examiners and applicants due to higher quality reviews

MEDIAN CHARGES FOR SERVICES: U.S. UTILITY PATENTS

APPLICATION AMENDMENT/ARGUMENT	2008	2010	2012
Minimal complexity	$1,850	$1,800	$1,800
Relatively complex—biotech / chemical	$3,200	$3,000	$3,000
Relatively complex—electrical / computer	$3,000	$3,000	$3,000
Relatively complex—mechanical	$2,500	$2,500	$2,500

RELATIONSHIP BETWEEN EXAMINER GS LEVELS AND THE NUMBER OF OFFICE ACTIONS, CONDITIONAL ON LESS THAN THREE OFFICER ACTIONS PER APPLICATION

	(1)
	OLS
	RESULTS
(Omitted: GS-7)	
GS-9	0.259***
	(0.008)
GS-11	0.438***
	(0.010)
GS-12	0.491***
	(0.011)
GS-13	0.511***
	(0.012)
GS-14	0.562***
	(0.012)
N	2,826,018

Cost-Benefits Analysis

Costs	Benefits
Personnel Expenses to Patent Office = $660 million	**Litigation Savings**
Potential Increase Attorney Fees 	**Decreased Prosecution Attorney Expenses = $301 million**
	Invalid Patents Impede Follow-on Innovation
TOTAL: 660 million	*Invalid Patents Can Cause Supra Competitive Pricing and Decrease Access*
	Non-Practicing Entities Can Utilize Invalid Patents to Extract Rents from Innovators
	Transactions Costs Associated with Licensing Invalid Patents
	Invalid Patents Can Impede Competitors from Entering the Market

Theory Litigations Savings if we Double Examiner Time Allocations

- Simulations suggest a 27 percent decrease in the Patent Office's grant rate

- Why would see litigation savings?
  - Fewer patents being allowed
  - The patents being allowed will be of higher quality

Quantify the Potential Savings associated with foregone Litigation Costs: Data & Methodology

- Collected data on all 3.9 million utility patent applications from PAIR from 2001-2017
- FOIA the PTO for annual roster indicating the GS-level and experience
- Data on future litigation outcomes from Lex Machina and PTAB outcomes
- Fixed Effects Methodology

Relationship between Examiner GS Levels and the Number of Times Individual Applications are Asserted in Litigation and Instituted in PTAB Proceedings: Negative Binomial Regression Results

	Number of Times Ultimately Asserted in Litigation	Number of Times Ultimately Instituted at PTAB
Incident Rate Ratios for: (Omitted: GS-7)		
GS-9	1.26** (0.13)	2.18 (1.06)
GS-11	1.29*** (0.14)	3.41*** (1.60)
GS-12	1.36*** (0.15)	2.91** (1.38)
GS-13	1.59*** (0.17)	3.12** (1.48)
GS-14	1.78*** (0.19)	3.55*** (1.68)

Simulated Reduction in Litigation Expenses Associated with Doubling of Time Allocated to Examiners

(1)	(2)	(3)	(4)
Number of Annual Reviews Completed by Examiners	Expected Number of Federal Case / Application Pairs Arising from Current Time Allocations	Estimated Decrease in Number of Patent Case / Application Pairs from Doubling of Examination Hours	Estimated Decrease in Litigation Costs
430,056	5,561	2,436	**$571,876,758.10**

But litigation savings come in the future

- Using a 3 percent discount rate and considering the average time to litigation:
  - Present value of the $572 million in annual litigation savings state above is $491 million
  - If we were to use a 7 percent discount rate, this would fall to $402 million

Simulated Reduction in PTAB Expenses Associated with Doubling Amount of Time Allocated to Examiners

(1)	(2)	(3)	(4)
Number of Annual Reviews Completed by Examiners	Expected Number of PTAB Challenges Arising Current Time Allocations	Estimated Decrease in Number of PTAB Challenges from Doubling of Examination Hours	Estimated Decrease in PTAB Challenge Costs
430,056	378	272	**$123,080,000**

PTAB expenses likewise occur in the future

- 3% discount rate = annual savings of $112 million
- $100 million if we were to use a 7 percent discount rate

Cost-Benefits Analysis

Costs	Benefits
Personnel Expenses to Patent Office = $660 million	**Litigation Savings= $491 million + $112 million**
Potential Increase Attorney Fees 	Decreased Prosecution Attorney Expenses = **$301 million**
	Invalid Patents Impede Follow-on Innovation
TOTAL: 660 million	*Invalid Patents Can Cause Supra Competitive Pricing and Decrease Access*
	Non-Practicing Entities Can Utilize Invalid Patents to Extract Rents from Innovators
	Transactions Costs Associated with Licensing Invalid Patents
	Invalid Patents Can Impede Competitors from Entering the Market

Should We Invest More Resources at the Patent Office?

Costs associated with doubling examiner time allocations are (660 million)

<<

Social benefits gained by resulting decrease number of invalid patents issued (904 million)

Yes, we should consider investing more resources at the Patent Office to weed out invalid patents!

Rethink Scaling Factors?

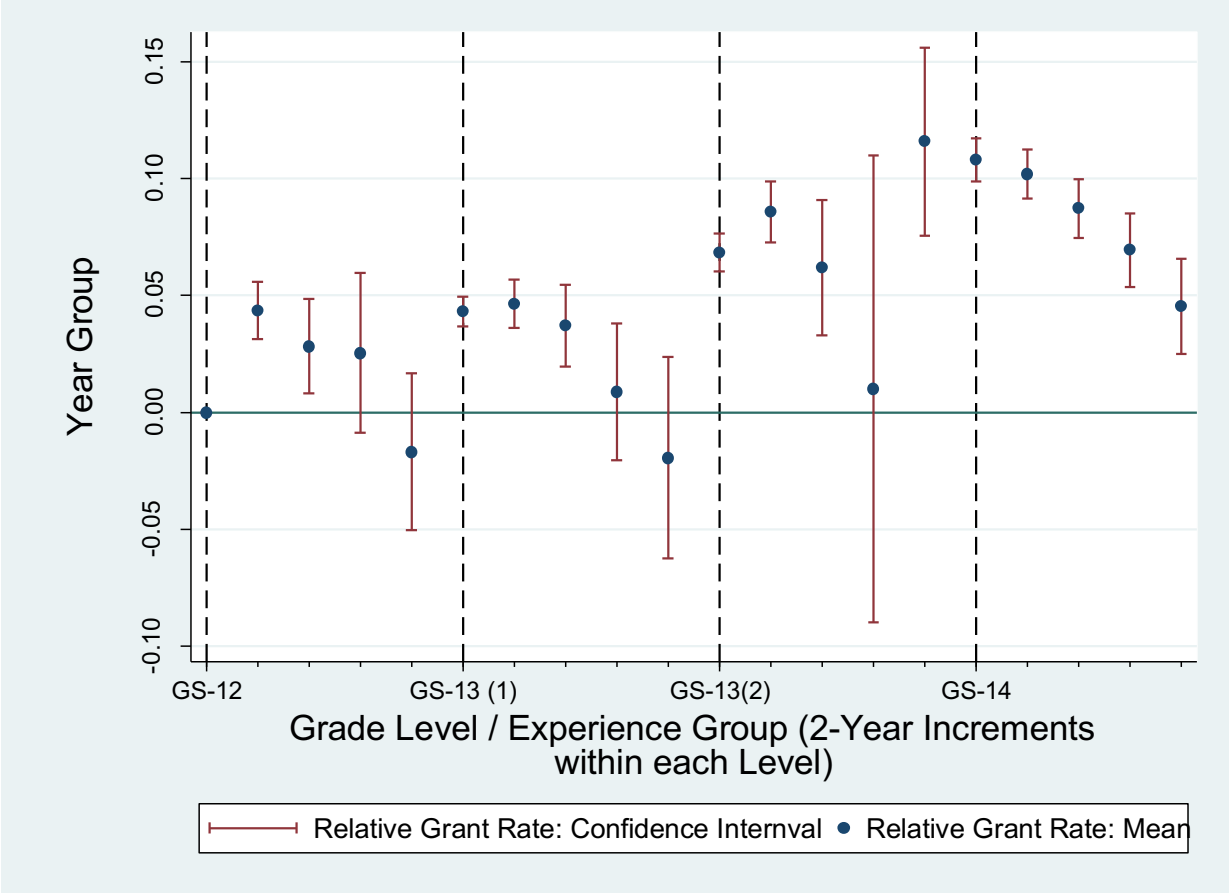
- If normative goal is to achieve similar application outcomes across different types of examiners (e.g., similar grant rates by GS-14 examiners and GS-7 examiners), our findings perhaps suggest that scaling factors should be revisited.

- That is, perhaps we shouldn't increase allocation times across the board, but greater increases as GS-levels rise (as the previous simulation exercise did).

- Thank you!

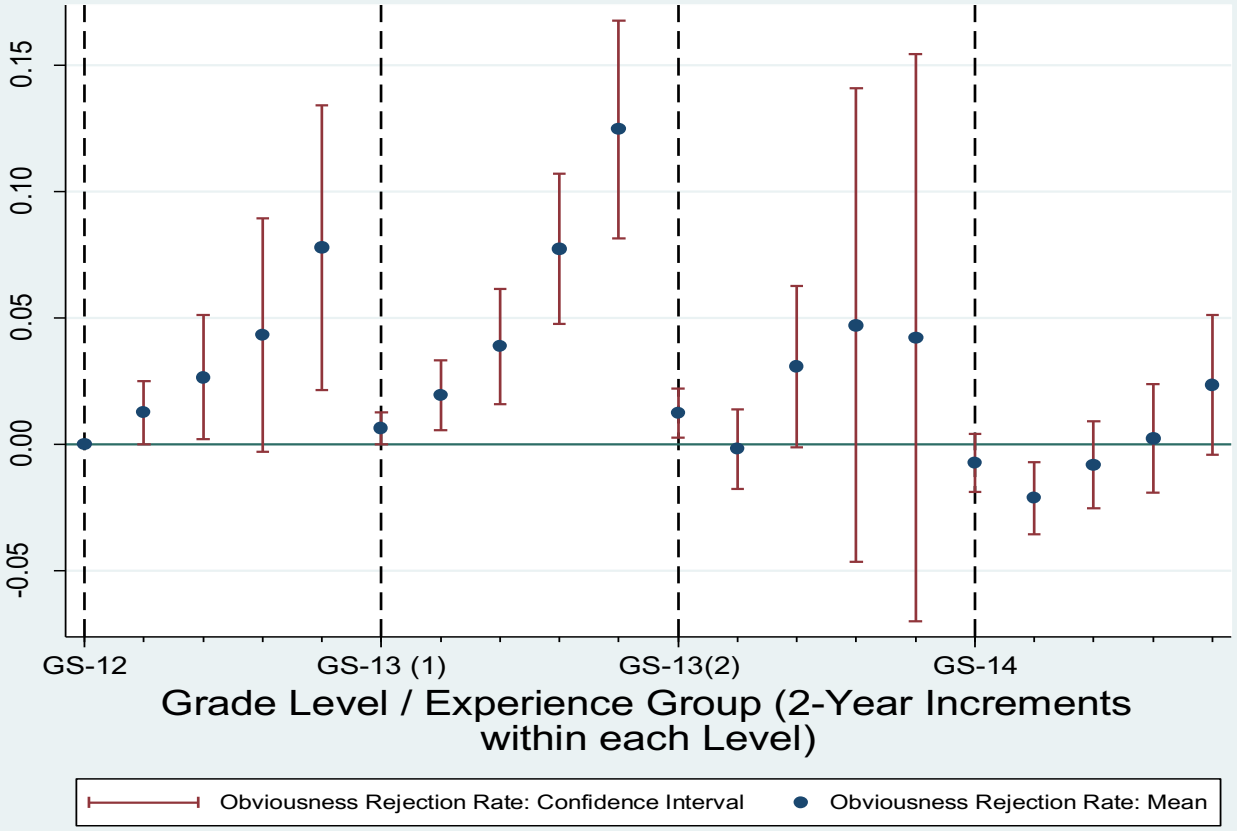
Results (con't)

Figure 3: Relationship between Grant Rate and Increases in Experience Years within Distinct Grade Levels



Results (con't)

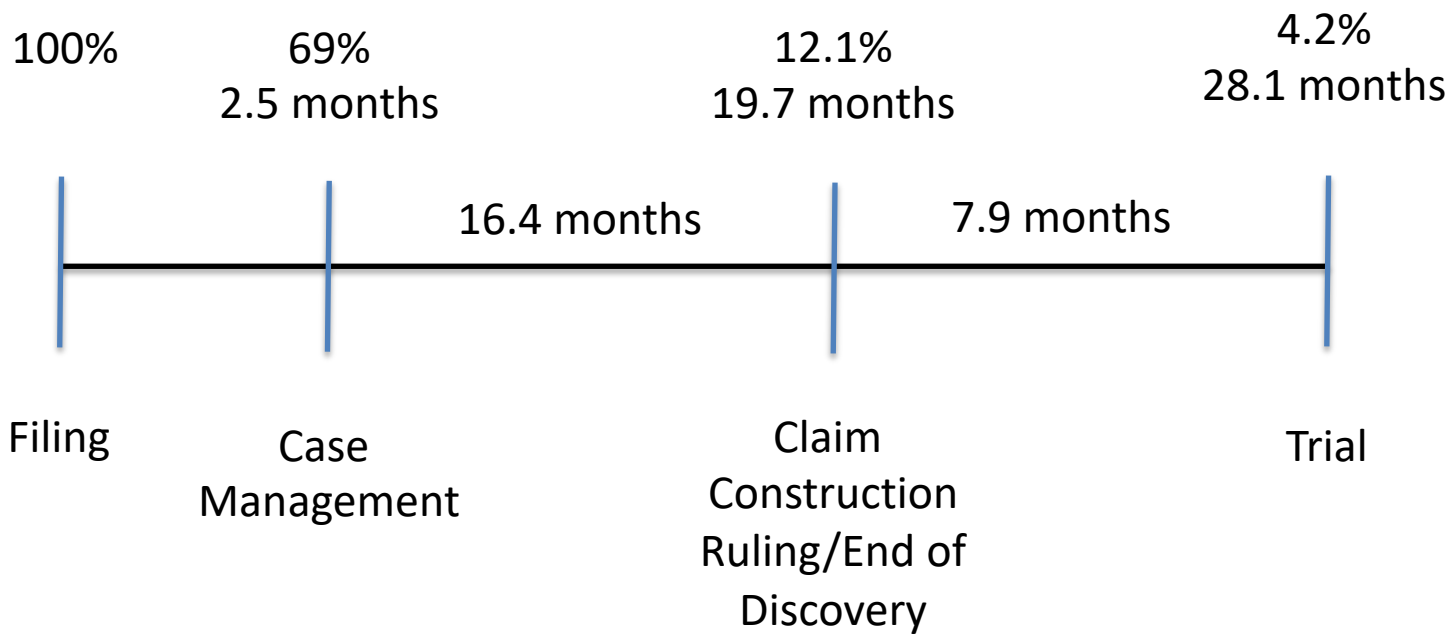
Relationship between Incidence of any Obviousness Rejection and Increases in Experience Years within Distinct Grade Levels



RELATIONSHIP BETWEEN ALLOWANCE RATE AT EPO AND JPO AND U.S. EXAMINER GRADE AND EXPERIENCE LEVELS, AMONG SET OF U.S. PATENTS LIKEWISE SEEKING PROTECTION AT EPO AND JPO

	(1)
Omitted: GS-7	
GS-9	-0.024 (0.018)
GS-11	-0.048*** (0.019)
GS-12	-0.056*** (0.019)
GS-13	-0.063*** (0.020)
GS-13 (with partial signatory authority)	-0.065*** (0.020)
GS-14	-0.070*** (0.021)
N	172103

Distribution of Cases



	25%	50%	75%
Litigation Savings	332 million	**572 million**	882 million

Stakes at Litigation

- The AIPLA reports litigation expenses (by stage of suit completion) separately for the following groups:
  - (1) less than $1 million at stake,
  - (2) $1-$10 million,
  - (3) $10-$25 million and
  - (4) $25+ million.
- Look at cases with reported damages
  - Lower Bound Estimate → We assume all cases that don't accumulate in damage award are less 1 million
  - Upper Bound Estimate → We scale reported damage awards for full set of filings

Stakes at Litigation

	Lower Bound	25%	Upper Bound
< $1 Million	96.2%	**86%**	55%
$1 - $10 Million	2%	**7%**	21%
$10-$25 Million	1.3%	**3%**	8%
> $25 Million	0.5%	**4%**	16%
Estimated Litigation Savings	432 million	**572 million**	2.3 billion

Expected Litigation Costs per Patent and per Patent /Case Pair

		(1)	(1)	(1)
		Probability Distribution	Litigation Costs (P and D), conditional on indicated combination of amounts at stake and stage of litigation	Expected Litigation Costs (Column 2 X Column 3)
Amount at Stake	Stage of Litigation	-	-	-
<$1 Million (86% of cases)	Pre-case-management (41%)	0.353	$40,000	$14,104.00
	Past-case- management, No Claim Construction (46.9%)	0.403	$440,000	$177,469.60
	Claim Construction, No Trial (7.9%)	0.068	$1,100,000	$74,734.00
	Trial (4.2%)	0.036	$1,400,000	$50,568.00
$1-$10 Million (7% of cases)	Pre-case-management (41%)	0.029	$100,000	$2,870.00
	Past-case- management, No Claim Construction (46.9%)	0.033	$1,050,000	$34,471.50
	Claim Construction, No Trial (7.9%)	0.006	$2,950,000	$16,313.50
	Trial (4.2%)	0.003	$4,000,000	$11,760.00
$10-$25 Million (3% of cases)	Pre-case-management (41%)	0.012	$172,000	$2,115.60
	Past-case- management, No Claim Construction (46.9%)	0.014	$2,072,000	$29,153.04
	Claim Construction, No Trial (7.9%)	0.002	$5,000,000	$11,850.00
	Trial (4.2%)	0.001	$6,200,000	$7,812.00
>$25 Million (4% of cases)	Pre-case-management (41%)	0.016	$238,000	$3,903.20
	Past-case- management, No Claim Construction (46.9%)	0.019	$3,238,000	$60,744.88
	Claim Construction, No Trial (7.9%)	0.003	$8,000,000	$25,280.00
	Trial (4.2%)	0.002	$10,000,000	$16,800.00
Total Expected Litigation Costs Per Case	-	-	-	$539,949.30
Total Expected Litigation Costs Per Patent / Case Pair	-	-	-	$234,760.60

Comparison Between Our results and Lemley's

Doubling Examiner Time Allocations

Lemley's Assumptions	Our Estimates
Assumes Patent Office will issue 10% percent fewer patents	Estimate that Patent Office will issue 27% fewer patents
Assumes 10% decrease in litigation costs	Estimate a 44% decrease in litigation costs*
Assumes doubling of patent-prosecution legal charges	Estimate possible potential savings but conservatively assume zero

* We utilize more conservative cost distribution for litigation stages than Lemley

Prosecution Expenses

- Theoretically ambiguous whether doubling examination time will increase prosecution attorney fees
  - Increase Cost per Round
  - Decrease Rounds of Review

Changes in Patent Prosecution (Attorney) Expenses

- Greater examination time:
  - Possibly greater attorney fees per round of review (to respond to stronger examiner rejections)
    - Little evidence of this
  - Possibly less back and forth between examiners and applicants due to higher quality reviews
    - Notable evidence of this

Decrease Prosecution Costs?: Decrease Rounds of Review

- Estimate 0.56 decrease in the number of rounds of review
- Constitute significant financial savings

RELATIONSHIP BETWEEN GRADE LEVELS AND SHARE OF PRIOR ART CITATIONS FROM EXAMINER

	(1)
Omitted: GS-7	
GS-9	0.004 (0.007)
GS-11	-0.009 (0.007)
GS-12	-0.027*** (0.007)
GS-13	-0.038*** (0.007)
GS-13 (with partial signatory authority)	-0.048*** (0.008)
GS-14	-0.051*** (0.008)
N	643838