Analyzing *High-Tech Employee*:
The Dos and Don'ts of Proving (and Disproving) Classwide Antitrust Impact in Wage Suppression Cases

Kevin Caves and Hal Singer

In re High-Tech Employee is a high-profile class action alleging that top executives at some of Silicon Valley's most prominent companies, including Apple, Google, Intel, and Adobe, conspired to restrict recruiting and hiring of high-tech workers as a mechanism for suppressing compensation. The class, which consists of approximately 60,000 technical, creative, and research and development employees, was certified in October 2013.[1] In May 2014, a proposed settlement of approximately $324.5 million was announced, only to be rejected in August 2014 by the district court, which found that the proposed amount "falls below the range of reasonableness."[2] With trial scheduled for April 2015, a new proposed settlement of approximately $415 million was filed with the court as this article went to press.[3]

The class action followed on the heels of a Department of Justice (DOJ) investigation in which the DOJ concluded that the defendants had entered into a web of bilateral agreements prohibiting "cold calling," which "disrupted the competitive market forces for employee talent"[4] and "substantially diminished competition to the detriment of the affected employees who were likely deprived of competitively important information and access to better job opportunities."[5] The DOJ investigation revealed substantial documentary evidence, as well as evidence of direct communications among the defendants. For example, Apple and Google allegedly maintained internal "Do Not Call Lists" containing the names of rival companies whose employees could not be solicited.[6] When Apple complained to Google that the agreement had been violated, Google allegedly responded with an internal investigation, subsequently reporting the results to Apple.[7]

■

Kevin W. Caves *is a Senior Economist at Economists Incorporated.*

Hal J. Singer *is a Principal at Economists Incorporated, a Senior Fellow at the Progressive Policy Institute, and an Adjunct Professor at Georgetown University's McDonough School of Business.*

---

[1] Order Granting Plaintiffs' Supplemental Motion for Class Certification, High-Tech Employee Antitrust Litig., No. 11-CV-02509 (N.D. Cal. Oct. 24, 2013).

[2] Order Denying Plaintiffs' Motion for Preliminary Approval of Settlements with Adobe, Apple, Google, and Intel, High-Tech Employee Antitrust Litig., No. 11-CV-02509 (N.D. Cal. Aug. 8, 2014); *see also* Jeff Elder, *Silicon Valley Tech Giants Discussed Hiring, Say Documents*, WALL ST. J., Apr. 20, 2014; *see also* Dan Levine, *Judge Rejects $324.5 Million Settlement over Apple, Google Hiring*, REUTERS, Aug. 8, 2014.

[3] Notice of Motion and Motion for Preliminary Approval of Class Action Settlement; Memorandum of Points and Authorities in Support Thereof, High-Tech Employee Antitrust Litig., No. 11-CV-02509 (N.D. Cal. Jan. 15, 2015); *see also* Megan Geuss, *Apple, Google Give High Tech Workers an Extra $90 Million in "No-Poach" Suit*, ARS TECHNICA (Jan. 15, 2015), http://arstechnica.com/tech-policy/2015/01/apple-google-give-high-tech-workers-an-extra-90-million-in-no-poach-suit/.

[4] Competitive Impact Statement, United States v. Adobe Systems, Inc., Case No. 1:10-cv-01629 (D.D.C. Sept. 24, 2010), *available at* http://www.justice.gov/atr/cases/adobe.htm.

[5] *Id.*

[6] *Id.*

[7] *Id.*

In another exchange, Apple CEO Steve Jobs allegedly warned Google founder Sergey Brin in 2005 that "[i]f you hire a single one of these people, that means war."[8]

Yet when the plaintiffs' theory of wage suppression is scrutinized with a view to developing a defensible proof of common impact, it becomes clear that the plaintiffs' path was far from straight-forward, particularly in light of the difficulties encountered by plaintiffs in prior class actions alleg-ing wage suppression, such as *Reed v. Advocate Health Care*.[9] The complicating factors in *High-Tech Employee* included (1) an alleged web of bilateral agreements spanning various time periods (as opposed to a single agreement encompassing all defendants); (2) a diverse array of class member job descriptions and compensation structures, with significant variation both within and between defendants; and (3) a lack of explicit wage fixing on the part of the defendants.

The plaintiffs' economic expert employed an econometrically intensive approach to proving classwide impact, drawing on a two-stage framework developed in prior wage suppression liti-gation. In contrast to the plaintiffs' data-driven strategy, the defendants' expert rebuttals tended to rely heavily on abstract methodological critiques. In certifying the class, the district court reject-ed these rebuttals, finding instead that the plaintiffs had presented a common and viable method for demonstrating classwide antitrust injury.

An examination of the court's findings in *High-Tech Employee*, along with the evidence prof-fered by experts for both the plaintiffs and the defense, offers insights into some of the "do's and don'ts" of proving (and disproving) classwide impact in wage suppression cases in particular and in antitrust class actions more generally.

The Plaintiffs' Proof of Impact

The plaintiffs' expert adopted a two-step methodology to demonstrating classwide impact, previ-ously developed and deployed in *Johnson v. AzHHA*.[10] The first step requires the expert to iden-tify a plausible economic theory, along with corroborating evidence, connecting the challenged conduct to a generalized anticompetitive effect (in this case, general wage suppression). In the second step, the expert must demonstrate the existence of a plausible mechanism (such as a rigid compensation structure) that would transmit these anticompetitive effects to all or a large share of the proposed class.[11] In *High-Tech Employee*, the plaintiffs' expert relied primarily on econometric analyses designed to show (1) that the alleged anti-solicitation agreements sup-pressed wages generally by imposing an informational asymmetry that inhibited the process of price discovery; and (2) that the defendants' implicit and explicit emphasis on internal equity—the notion that employees doing the same work should generally receive similar compensation—created uniform and rigid compensation structures, leading to classwide impact.

Step 1: General Wage Suppression. The plaintiffs' theory of general wage suppression was rooted in the economics of information. According to the plaintiffs' expert, the practice of cold call-ing (if permitted) would transmit information on salaries and benefits across both employees and

---

[8] Elder, *supra* note 2.

[9] No. 06 C 3337, 2009 Dist. LEXIS 89576 (N.D. Ill. 2009). *See also* Robert E. Bloch & Scott P. Perlman, Reed v. Advocate Health Car*e: Anatomy of Class Certification Proceedings in a Wage Conspiracy Case*, ANTITRUST, Summer 2010, at 63–70.

[10] Johnson v. Ariz. Hosp. & Healthcare Ass'n (AzHHA), No. CV 07-1292-PHXSRB, 2009 WL 5031334 (D. Ariz. July 14, 2009). Both authors served as consultants for the plaintiffs in *Johnson. See also* Hal J. Singer, *Economic Evidence of Common Impact for Class Certification in Antitrust Cases: A Two-Step Analysis*, ANTITRUST, Summer 2011, at 34–39.

[11] Order Granting Plaintiffs' Supplemental Motion for Class Certification at 53, High-Tech Employee Antitrust Litig., No. 11-CV-02509 (N.D. Cal. Oct. 24, 2013) (noting that the plaintiffs' expert "followed a roadmap widely accepted in antitrust class actions that use evidence of gen-eral price effects plus evidence of a price structure to conclude that common evidence is capable of showing widespread harm to the class," and citing *Johnson*, 2009 WL 5031334, at *8, *11).

employers, ultimately influencing the market wage. This would facilitate wage adjustment through the standard model of supply and demand in the labor market, according to which employees and employers are symmetrically informed about labor market conditions. In this case, an increase in the demand for high-tech labor would result in a temporary shortage, which would rapidly be alleviated as the shortage is simultaneously "discovered" by both employers and employees, with both the market wage and the employment level rising to equate supply and demand.

More precisely, in the absence of impediments to price discovery, wages and employment are given by the intersection of labor supply LS and labor demand LD (see Figure 1). When labor demand shifts outward, the equilibrium wage rises (from W_1 to W_2) as does the equilibrium employment level (from L_1 to L_2). After the adjustment, demand is once again equal to supply.

Figure 1: Wage & Employment Growth Under Competition
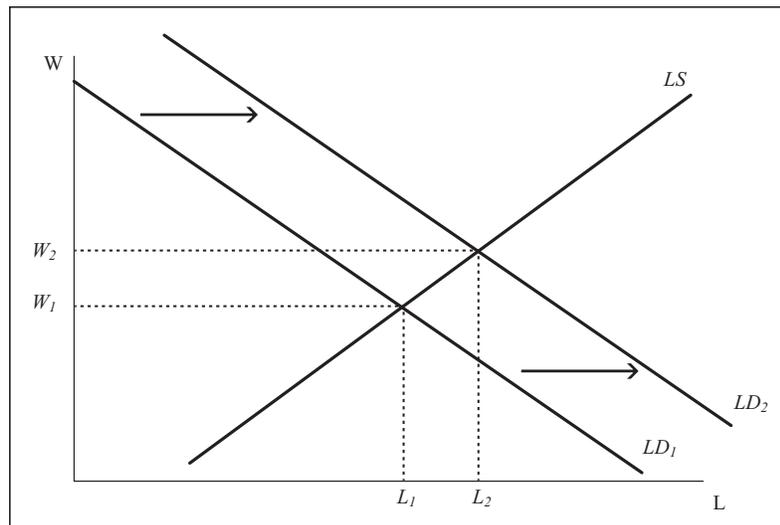
The plaintiffs' expert observed that this price discovery mechanism could be subverted if employers collectively could prevent employees from learning that others would be willing to hire them for more than what they are currently earning. A "temporary" shortage then could become permanent, with employers collectively willing to accept a smaller workforce in exchange for lower rates of compensation (just as a monopolist accepts lower output in exchange for higher prices). Under collusion, employers perceive the marginal cost of labor, MC_L, which lies above the LS curve, because colluding firms (unlike their competitive counterparts) perceive that an increase in collective hiring levels pushes up the equilibrium wage (see Figure 2). Optimal wage and employment levels (from employers' perspectives) are now given by the intersection of the MC_L curve and labor demand. Thus, even when the demand for labor increases substantially, employment and compensation remain stuck at L_1 and W_1, because the marginal cost to employers of expanding employment would exceed the marginal benefit. Employees, for their part, do not perceive any shortage in the labor market, and are therefore unable to bid up compensation from the initial level.[12]

---

[12] For ease of exposition, we have drawn the curves in Figure 2 to guarantee that an expansion in labor demand does not generate any increase in equilibrium compensation or employment levels. In general, compensation and employment may well increase under collusion, albeit at a slower pace than under competition.

Figure 2: Effect of Collusion on Wage & Employment Growth
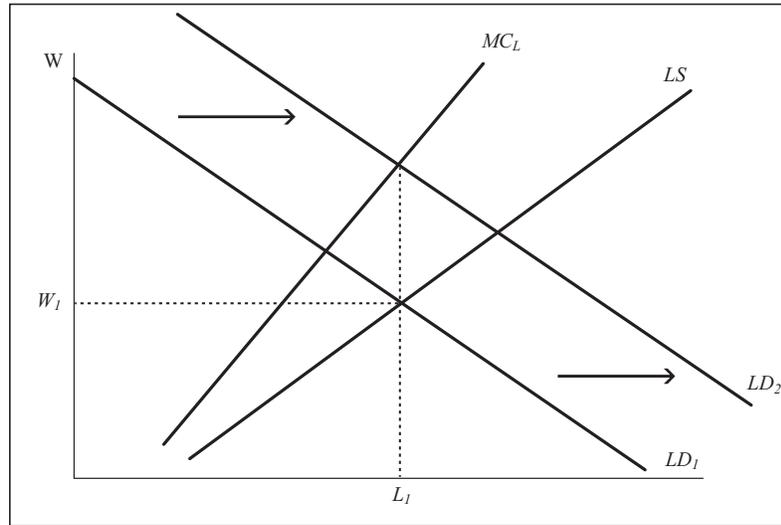
The plaintiffs' expert presented an econometric analysis designed to test this theory, using a "Conduct Regression" that sought to explain variation in real annual employee compensation (the dependent variable), with variation in the alleged anticompetitive conduct (calculated as the proportion of months in a given year during which the employer in question was subject to one or more of the anti-solicitation agreements), and other explanatory variables, including employee age, gender, and years at company, employer revenue, and number of new hires.[13] Based on the Conduct Regression, the plaintiffs' expert concluded that the alleged anticompetitive conduct was associated with lower average levels of compensation at each defendant, resulting in aggregate damages of approximately $3 billion. The court agreed that the analysis "was capable of showing that Defendants' total expenditures on compensation [were] less than they would have been in the absence of anti-solicitation agreements and thus capable of showing classwide damages."[14]

Step 2: Rigid Compensation Structure. To show that the average wage suppression measured by the Conduct Regression resulted in classwide impact, the plaintiffs sought to complete their two-step proof by presenting evidence of a rigid compensation structure. If present, such a structure would imply that any wage suppression would have been transmitted across the class because compensation levels across employees would tend to move together. The plaintiffs appealed to the economic literature on labor markets showing that, in order to facilitate long-term contracting for labor, firms may institute commitment devices and loyalty-building mechanisms, including the "sharing of [a firm's] rewards with more equality than a market might otherwise produce."[15] The plaintiffs also pointed to evidence that the defendants placed a premium on "internal equity."[16] That evidence included using software to compare employee compensation across peer groups, advising managers that internal equity was a "prime consideration when setting and

---

[13] Order Granting Plaintiffs' Supplemental Motion for Class Certification at 59, High-Tech Employee Antitrust Litig., No. 11-CV-02509 (N.D. Cal. Oct. 24, 2013).

[14] *Id.* at 60.

[15] *Id.* at 56.

[16] *Id.* at 66.

adjusting salaries,"[17] and actively monitoring compensation structures to address discrepancies within and across job titles.[18]

The plaintiffs' expert also presented econometric analyses designed to prove the existence of a pricing structure. First, to demonstrate compensation rigidity within a given job title, the plaintiffs' expert regressed individual compensation data on several variables, such as age, number of months at the company, gender, location, title, and employer.[19] According to this analysis, approximately 90 percent of individual compensation could be explained by these "Common Factors," suggesting the existence of a compensation structure built around these factors, at least within a given job title.[20]

Second, to demonstrate compensation rigidity across job titles, the plaintiffs' expert estimated analogous regressions designed to compare the "movement over time of the average compensation of each title with the average compensation of the firm's Technical Class."[21] That is, for each defendant, the average compensation paid for a given job title in a given time period was regressed on the average compensation across all technical employees in all job titles in the same time period (and in the prior period), as well as on other variables thought to influence compensation, including the firm's revenue growth and the rate of job growth in the region.[22] Separate regressions were estimated for each job title within each company.[23] These regressions measure the extent to which an increase in the average compensation paid to all technical employees within a given firm is statistically associated with an increase in compensation for a given job title at that firm. For example, a regression specific to software engineers at Adobe would measure the extent to which an increase in average compensation across all technical employees at Adobe is statistically associated with an increase in average compensation for only Adobe's software engineers.

According to the plaintiffs' expert's regressions, the "vast majority" of employees fall within job titles or groups for which (1) the gains for the titles or groups are shared broadly at the same time, and (2) the gains for some are shared with others in different job titles in the subsequent year.[24] The court found that this result, combined with the Common Factors regressions, "bolsters the plaintiffs' theory that there is a wage structure in place under which an impact on some employees would have resulted in an impact to all or nearly all employees."[25] The court also found this econometric evidence to be "consistent with the documentary evidence that suggests that Defendants maintained a formal wage structure and valued internal equity."[26]

Defendants' Rebuttals and Court's Findings

In attempting to defeat class certification, the defendants and their experts relied less on quantitative analysis, focusing instead on qualitative arguments and broad methodological critiques.

---

[17] *Id.*

[18] *Id.*

[19] *Id.* at 58.

[20] *Id.*

[21] *Id.* at 60–61.

[22] *Id.* at 60–63.

[23] *Id.* at 62.

[24] *Id.*

[25] *Id.* at 72.

[26] *Id.*

Their primary arguments were (1) that compensation practices did not follow a rigid structure and instead were highly individualized; and (2) that the plaintiffs' expert's analyses were rendered unreliable by methodological and statistical flaws.

To rebut the plaintiffs' claim of a rigid compensation structure, the defendants claimed that compensation was "set by hundreds of different managers who were directed to differentiate pay and reward high achieving employees."[27] However, because these claims were based "principally on declarations from top management in their human resources, recruitment, compensation, and benefits departments," which were "drafted for the specific purpose of opposing Plaintiffs' class certification motion,"[28] the court found this evidence to have "diminished probative value."[29]

The defendants' experts argued that the plaintiffs' regressions suffered from endogeneity bias as a result of an (unspecified) omitted variable, noting that an endogeneity problem "arises when some of the same unmeasured common factors drive both the independent and dependent variables."[30] The court was unpersuaded, noting that the defendants had failed to specify what the omitted variable might be, or how its exclusion might have altered the results of the plaintiffs' expert's analysis.[31] The defendants' experts also argued—at a purely conceptual level—that the plaintiffs' statistical evidence did not constitute proof of causation.[32] The court rejected this argument as well, favorably citing the plaintiffs' expert, who noted that economists "analyze correlations, which are routinely used . . . to draw causal conclusions when supported by compelling frameworks and complementary information."[33]

The defendants' experts also reported that, after correcting for within-firm correlations in compensation levels, the plaintiffs' expert's regression results were statistically insignificant at conventional significance levels.[34] But the court found that this "did not provide a sufficient basis to conclude that the Conduct Regression failed to provide a reliable methodology for the purposes of class certification,"[35] noting that even the defendants' expert had conceded that a "model's results need not necessarily be statistically significant to be reliable."[36]

In attempting to defeat class certification, the defendants and their experts relied less on quantitative analysis, focusing instead on qualitative arguments and broad methodological critiques.

---

[27] *Id.* at 65.

[28] *Id.*

[29] *Id.* at 67.

[30] *Id.* at 73.

[31] *Id.* at 74.

[32] *Id.* at 74–75.

[33] *Id.* at 75.

[34] Specifically, the defendants argued that the plaintiffs' expert should have used "clustered" standard errors. *Id.* at 80–81. The use of clustered standard errors allows for the regression error term to be correlated within a pre-defined cluster. For example, one might hypothesize that salary structures at Defendant *A* are subject to common, unobserved shocks that differ systematically from those at Defendant *B*. If left uncorrected, this heteroskedasticity can lead to false conclusions regarding the precision of econometric instruments, which may invalidate statistical inference. *See, e.g.*, JEFFREY M. WOOLDRIDGE, INTRODUCTORY ECONOMETRICS: A MODERN APPROACH 264–99 (4th ed. 2009).

[35] Order Granting Plaintiffs' Supplemental Motion for Class Certification at 81, High-Tech Employee Antitrust Litig., No. 11-CV-02509 (N.D. Cal. Oct. 24, 2013).

[36] *Id.* The court revisited the issue of statistical significance when it denied the defendants' motion to exclude the testimony of the plaintiffs' expert on *Daubert* grounds. While acknowledging "ample evidence" that the one-, five-, and ten-percent significance levels are indeed conventional among statisticians, the court noted that the choice of a significance level involves tradeoffs between the risks and costs of "Type I" and "Type II" errors. The Court also cited scholarly evidence that "the conventional [significance] levels should not be blindly applied in every case but that a level should be selected after a careful consideration of the particular study at hand." *See* Order Re: Defendants' Motions Regarding Dr. Leamer and Defendants' Joint Motion for Summary Judgment Based on Motion to Exclude Testimony of Dr. Leamer at 25–29, High-Tech Employee Antitrust Litig., No. 11-CV-02509 (N.D. Cal. Apr. 4, 2014).

The defendants' experts also argued that "[b]y averaging the compensation of all employees who hold the same job title [the plaintiffs' expert] necessarily wipes out the very thing he is supposed to be measuring—the significant variation in individual employees' compensation."[37] The court rejected this argument, noting (1) that averaging does not mask variation across job titles (only within them); and (2) that the plaintiffs' Common Factors analysis had used employee-specific data that was not averaged.[38]

The defendants unsuccessfully raised some of the same critiques in their motion to exclude the testimony of the plaintiffs' expert on *Daubert* grounds. In addition, they claimed that the plaintiffs had failed to distinguish econometrically between the effect of the challenged conduct and the effects of other, unchallenged agreements. For example, there was evidence that Google had entered into do-not-cold-call agreements with non-defendant companies,[39] and the plaintiffs' expert had conceded that his Conduct Regression—which used a variable indicating the share of the months of the year during which the challenged agreements were in effect—would pick up the compensation suppression effects stemming from anything that was applicable to the class period from 2005 to 2009 when the variable is turned on.[40] However, the court rejected "the rationale underlying Defendants' argument—that *Comcast* holds that a damages model must precisely segregate out effects of every possible factor, including legal conduct, that could impact the dependent variable, in order to be admissible under *Daubert*"[41]—in favor of "well-established Supreme Court and Ninth Circuit authority holding that damages in antitrust cases often cannot, and therefore need not, be proven with exact certainty."[42] Also rejected was the defendants' claim that the plaintiffs' expert "cannot rely on his conduct regression to establish the existence of classwide impact when he admits the model is incapable of showing that each class member was injured."[43] The court dismissed this as a "misleading characterization,"[44] given that the plaintiffs' expert had never claimed that the Conduct Regression would prove classwide impact, and instead had presented it as "reliable proof that the anti-solicitation agreements had a *general* impact on the class."[45]

Lessons for Plaintiffs and Defendants

The record in *High-Tech Employee* suggests that, even in the absence of explicit wage fixing, and even in the presence of substantial differences within and across defendant firms, wage suppression claims may be found amenable to common proof provided that there is sufficient documentary support, buttressed by econometric evidence yielding outcomes consistent with the plaintiffs' reading of the documents. The plaintiffs' expert can implement the two-step proof of

---

[37] Order Granting Plaintiffs' Supplemental Motion for Class Certification at 70, High-Tech Employee Antitrust Litig., No. 11-CV-02509 (N.D. Cal. Oct. 24, 2013).

[38] *Id.* at 71–72.

[39] Order Re: Defendants' Motions Regarding Dr. Leamer and Defendants' Joint Motion for Summary Judgment Based on Motion to Exclude Testimony of Dr. Leamer at 29, High-Tech Employee Antitrust Litig., No. 11-CV-02509 (N.D. Cal. Apr. 4, 2014).

[40] *Id.* at 29–30.

[41] *Id.* at 33.

[42] *Id.*

[43] *Id.* at 43–44.

[44] *Id.* 44.

[45] *Id.*

impact developed in *Johnson* by using one set of regressions to show average wage suppression, and a second set of regressions to show rigidity in the defendants' compensation structures, both within a given job category and across different job categories.[46]

From the point of view of defendants, *High-Tech Employee* suggests that heavy reliance on abstract methodological critiques is a risky strategy, especially when the plaintiffs offer an econometrically intensive proof of impact. In general, had the defendants' arguments been complemented by more empirical analysis to demonstrate their relevance, they might have been more persuasive to the court.

For example, the plaintiffs' empirical proof of the rigidity of the defendants' compensation structures, which relied on correlations between average firm-wide compensation and compensation for individual job titles, might have been susceptible to a more data-driven rebuttal. Presumably such a rebuttal would emphasize that any factor that increases compensation for a given job title must, by definition, increase the firm-wide average. Experts for the defense could have quantified this bias using instrumental variables techniques,[47] through sensitivity analyses, or both. It also appears likely that the defendants themselves may have been able to identify real-world factors that would have contributed to this bias, focusing on large changes in compensation for the most common job titles at a given firm.

Another empirical rebuttal could involve testing other implications of the plaintiffs' theory. If the plaintiffs' theory has multiple implications, and some are demonstrably absent from the data, that could raise serious questions about the reliability of plaintiffs' proof of impact. For example, the plaintiffs' theory alleges that the challenged agreements, in addition to suppressing compensation, also suppressed recruiting and hiring. One could test whether the challenged agreements actually were associated with less hiring activity using much of same data utilized in the plaintiffs' Conduct Regression, repurposing the number of new hires as the dependent variable. If the challenged agreements were found to be positively associated with new hiring activity, or if the relationship were found to be statistically indistinguishable from zero, some of the underpinnings of plaintiffs' proof of impact could come into question.[48]

In summary, the plaintiffs' success in obtaining class certification in *High-Tech Employee* strongly suggests that, when the plaintiffs' experts use econometric tools to prove impact, the defendants' experts should reply in kind, or risk forfeiting opportunities to convince the court that any apparent weaknesses in the plaintiffs' proof of impact actually render it unreliable in practice. Broad topics such as endogeneity bias or the proper thresholds for statistical significance almost always can be argued from either side and are unlikely to be effective unless their empirical relevance to the case at hand can be demonstrated convincingly. ●

From the point of

view of defendants,

High-Tech Employee

suggests that heavy

reliance on abstract

methodological

critiques is a risky

strategy . . .

---

[46] This is not to say that a price structure cannot be proven in other ways—for example, by proof that transaction prices rarely deviate from posted prices, or when they do, they do so in formulaic debits or credits that would be perpetuated in the but-for world.

[47] A suitable instrumental variable should be correlated with average compensation, yet uncorrelated with unobserved factors that shift individual job title compensation. For example, if the dependent variable in the regression is for Adobe software engineers, one candidate for an instrumental variable might be the average compensation across Adobe technical employees excluding software engineers.

[48] Employers have the incentive and ability to suppress wages only if they face an upward-sloping supply curve—that is, only if additional hiring places upward pressure on wages. To see this, note that there would be no mechanism for wage suppression if the *LS* curves in Figures 1 and 2 were flat, rather than upward sloping.