

EXHIBIT

B

**EXPERT REPORT AND APPENDICES
ON BEHALF OF DEFENDANT IN
MARIA M. GONZALEZ, ET AL. V. STATE OF ARIZONA, ET AL.
No. CV06-1268-PHX-ROS**

Jeffrey S. Zax, Ph. D.

15 February 2008

Table of contents

I.	Review of “The effect of Proposition 200 on voter registration in Arizona”, by Dr. Louis R. Lanier	-2-
A.	No evidence that Hispanic registrations declined	-3-
	Chart 1: Chart 1 from Dr. Lanier's report, modified	-5-
	Chart 2: Chart 2 from Dr. Lanier's report, modified	-7-
B.	Misspecified regressions	-9-
	Figure 1: Effect of binary variable for even years	-11-
	Figure 2: Effect of binary variable for Presidential election years	-12-
	Figure 3: Effect of trend	-13-
	Figure 4: Effect of binary variable for post-Proposition 200 years	-14-
	Figure 5: Sum of effects for even years, Presidential years, trend and post-Proposition 200 years	-15-
C.	Incorrect tests of statistical significance	-18-
II.	Review of “Written Report of Dr. Rodolfo Espino with respect to the effects of Proposition 200 on Arizona’s Hispanic population”	-22-
A.	Noncomparable time periods	-22-
	Chart 3: Figure 1 from Dr. Espino's report, modified	-23-
B.	Absence of statistical support	-26-
	Chart 4: Figure 3 from Dr. Espino's report, modified	-27-
III.	Review of “Expert report of Dr. Jorge Chapa”	-29-
IV.	Review of “Preliminary report of Dr. Richard L. Engstrom”	-30-
V.	Summary	-34-
	References	-35-

I am a Professor of Economics and the Associate Chair of the Department of Economics at the University of Colorado at Boulder. I received my Ph.D. degree in Economics from Harvard University in 1984. I teach undergraduate courses in inequality and discrimination, statistics and econometrics. I teach doctoral seminars in labor economics and local public finance. I am the only current member of my Department to have won the Department's annual teaching award more than once.

My published articles in peer-reviewed professional journals include many that address issues of discrimination and of minority representation. I am an associate editor of the China Economic Review and have served as a referee for over 50 journals in many different fields in the social sciences, as well as for the National Science Foundation. My professional biography is included in the Fourth Edition of Who's Who in Economics. My C.V. is attached as Appendix A.

I am paid \$300 per hour spent in the creation of this report and for any subsequent work requested by my client. This may include, but is not limited to, review of and responses to any additional disclosures by the Plaintiffs, their attorneys and their expert witnesses.

This report reviews "The effect of Proposition 200 on voter registration in Arizona", by Dr. Louis R. Lanier, the "Written Report of Dr. Rodolfo Espino with respect to the effects of Proposition 200 on Arizona's Hispanic population", the "Expert report of Dr. Jorge Chapa" and the "Preliminary report of Dr. Richard L. Engstrom". This review addresses the scientific validity of the techniques employed by these reports and the quality of the evidence that they present and the extent of support for the conclusions that they draw.

The opinions in this report are based on this review, on the expertise of the author and on the authorities cited in the References. These opinions are subject to change if further opinions

are disclosed by the authors of the reviewed reports. Moreover, these authors have failed to fully disclose their methods and data. The opinions stated herein will also be subject to change in the event of further disclosures.

I. Review of “The effect of Proposition 200 on voter registration in Arizona”, by Dr. Louis R. Lanier

Dr. Lanier’s report attempts to assess the effects of Proposition 200 on Hispanic and non-Hispanic voter registrations. It makes four claims (paragraph 7, pg. 3):

1. “The implementation of Prop 200 in January 2005 is correlated with a fall in both Hispanic and non-Hispanic voter registrations”,
2. “The fall in Hispanic voter registrations was more severe than the fall in non-Hispanic voter registrations”,
3. “Neither Hispanic nor non-Hispanic voter registrations have recovered to levels that would have been predicted, given pre-Prop 200 trends”, and
4. “Hispanic voter registrations remain further below predicted levels than non-Hispanic voter registrations in the time since Prop 200 was implemented”.

The validity of these claims cannot be fully assessed because Dr. Lanier has not fully disclosed the data and methods which he used to form his opinions.

These opinions are also based on Dr. Lanier's assumption (paragraph 8, pg. 3) “that relative trends in Hispanic and non-Hispanic voting-age populations were the same after the implementation of Prop 200 as they were immediately prior to its implementation.” No evidence is offered in support of this assumption. Moreover, this assumption is inappropriate. Any analysis of voter registration should be based on the populations of voting-age Arizonans who are eligible to vote.

Lastly, these opinions are based on Hispanic identifications using the Passel-Word Spanish Surname list. Perkins (1993) describes a validation study in which 10.85% Arizona residents identified as Hispanics by this list did not, in fact, claim Hispanic identity. Of Arizona residents claiming Hispanic identity, 22.50% were not identified by this list. Errors would be somewhat more frequent in Dr. Lanier's data because the list is somewhat more successful at identifying children than adults.¹ As a consequence of these errors, Dr. Lanier's statistical analyses are less accurate than they appear to be.

In addition to these general reservations, Dr. Lanier's work fails to support his conclusions. Appropriate comparisons demonstrate that Hispanic registrations did not decline after the implementation of Proposition 200. The results of Dr. Lanier's regression analysis are almost certainly the consequence of misspecified equations rather than accurate representations of registration experience. Lastly, Dr. Lanier's claims of statistical significance are almost certainly unfounded.

A. No evidence that Hispanic registrations declined

Charts 1 and 2 of Dr. Lanier's report present, respectively, Dr. Lanier's estimates of Hispanic and non-Hispanic voter registrations in Arizona during the period beginning with January 2000 and ending in July 2007. These charts contradict his first two claims. This is immediately apparent in the comparison between the period subsequent to the implementation of Proposition 200 and the same part of the Presidential election cycle in the period preceding its implementation.

The period subsequent to the implementation of Proposition 200 examined by Dr. Lanier

¹ The list is also more successful at identifying men than women.

begins in January 2005, approximately two months after the preceding Presidential election in November 2004. It continues for two years and seven months, to July 2007. It does not contain a Presidential election, nor the approximately 16 months that would precede a Presidential election.

The period prior to the implementation of Proposition 200 contains two Presidential elections. It also includes approximately eleven months prior to the Presidential election of November 2000, and sixteen months prior to the Presidential election of November 2004. As Dr. Lanier's charts 1 and 2 demonstrate, registration behavior exhibits peaks during the periods preceding Presidential elections which are well in excess of any registration levels during other periods. Therefore, these periods are not comparable to the period subsequent to the implementation of Proposition 200.

Instead, the comparable period prior to the implementation of Proposition 200 begins in January 2001, again approximately two months after the preceding Presidential election in November 2000. It ends two years and seven months later, in July 2003.

Chart 1 of this report compares Hispanic Arizona voter registrations during only this period to the comparable period subsequent to the implementation of Proposition 200. It reproduces Dr. Lanier's Chart 1, but deletes the two Presidential election cycles of January through November 2000 and August 2003 through November 2004. It is obvious that the number of Hispanic registrations throughout the period subsequent to the implementation of Proposition 200 exceeded the number of Hispanic registrations at the equivalent points in the period prior to the implementation of Proposition 200.

Chart 1: Chart 1 from Dr. Lanier's report, modified

Chart 1
Hispanic Arizona Voter Registrations
Actual and Predicted Registrations Following Prop 200

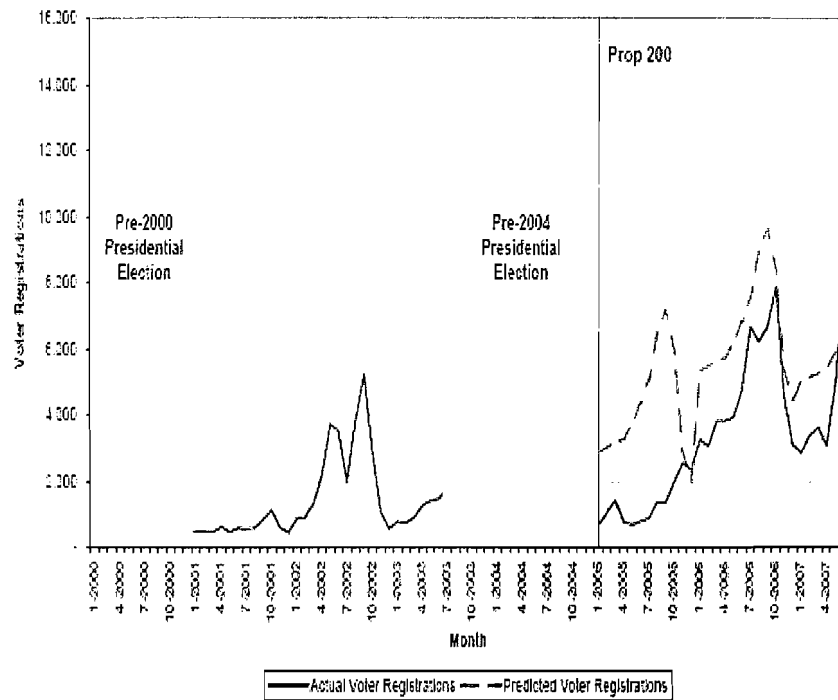


Chart 2 of this report makes the same comparison for non-Hispanic Arizona voter registrations. It reproduces Dr. Lanier's Chart 2, but again deletes the two Presidential election cycles of January through November 2000 and August 2003 through November 2004. As with chart 1, the number of non-Hispanic registrations throughout the period subsequent to the implementation of Proposition 200 exceeded the number of non-Hispanic registrations at the equivalent points in the period prior to the implementation of Proposition 200.

Chart 2: Chart 2 from Dr. Lanier's report, modified

Chart 2
Non-Hispanic Arizona Voter Registrations
Actual and Predicted Registrations Following Prop 200

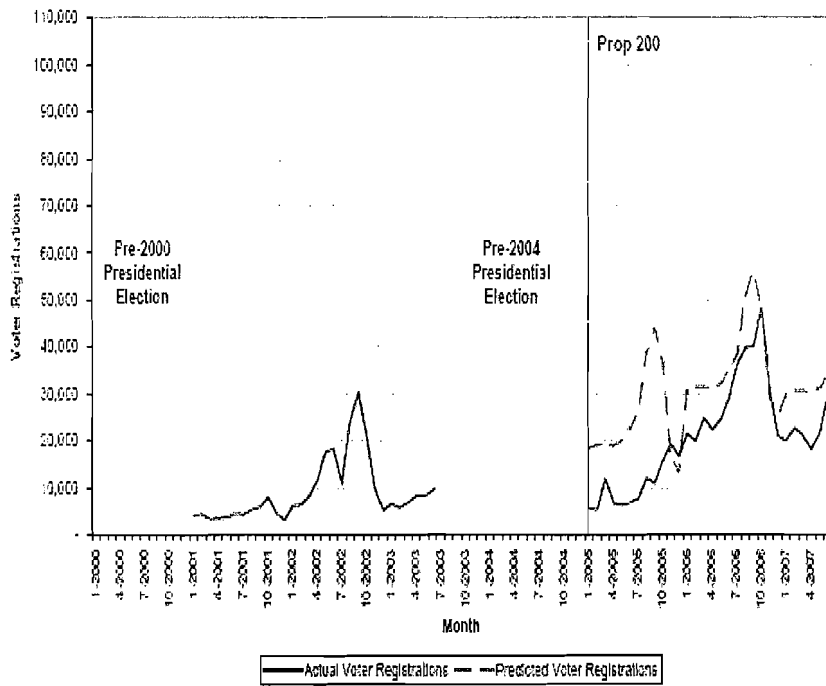


Chart 1 demonstrates conclusively that Hispanic registrations in period subsequent to the implementation of Proposition 200 were greater than they were in the equivalent period prior to its implementation. Chart 2 presents the same demonstration for non-Hispanic registrations. Consequently, Dr. Lanier's data contradict his first claim.

Dr. Lanier's data also demonstrate that the increases in registrations by Hispanics and non-Hispanics are of very similar magnitude. For example, new Hispanic registrations in the period subsequent to the implementation of Proposition 200 peaked in approximately September 2006, at approximately 8,000. The parallel peak in the comparable period prior to the implementation of Proposition 200 occurred in approximately September 2002, at approximately 5,000 Hispanic registrations. The later peak recorded approximately 60% more registrations than did the earlier peak.

September 2006 also saw the post-Proposition 200 peak in non-Hispanic registrations, at approximately 48,000. In the equivalent pre-Proposition 200 peak of September 2002, non-Hispanic registrations were approximately 30,000. As with Hispanic registrations, the peak number of monthly non-Hispanic registrations subsequent to the implementation of Proposition 200 was approximately 60% greater than the number of non-Hispanic registrations in the equivalent pre-Proposition 200 month.

Moreover, there appears to be a second post-Proposition 200 peak in Hispanic registrations of nearly 8,000 in July 2007. This appears to be more than four times the number of Hispanic registrations in the corresponding pre-Proposition 200 month, July 2003. In contrast, non-Hispanic registrations in July 2007 were only three times as large as non-Hispanic registrations in July 2003. By this measure, Hispanic registrations not only grew, but grew more

quickly subsequent to the implementation of Proposition 200 than did registrations of non-Hispanics.²

Consequently, Dr. Lanier's data contradict his second claim. The increase in Hispanic registrations after the implementation of Proposition 200 appears to be at least as large, and, if anything, larger than the contemporaneous increase in non-Hispanic registrations

B. Misspecified regressions

Dr. Lanier supports his first and second claims with the three regression analyses which appear in the 17th through 25th pages of his report, the first six pages of his Appendix B. These regression analyses indicate that registrations declined, with acceptable statistical significance, in the period subsequent to the implementation of Proposition 200.

As demonstrated above, actual registrations in the period subsequent to the implementation of Proposition 200 exceed those for the equivalent period prior to its implementation. Nevertheless, Dr. Lanier's regressions indicate that registrations were lower in post-Proposition 200 period than in the entire pre-Proposition 200 period. This suggests that Dr. Lanier's regressions rely improperly on the higher levels of pre-Proposition 200 registrations that occurred during the two Presidential elections cycles of that period. This suggestion is confirmed by the specification of Dr. Lanier's regressions, as revealed in Appendix B of his report.

² Dr. Lanier (paragraph 18, page 7) appears to dismiss the high number of Hispanic registrations in May through July 2007 as an “outlier”, the consequence of a voter registration drive. However, Dr. Lanier's only source for this claim is the plaintiffs' attorneys. Moreover, Dr. Lanier does not discuss whether this voter registration drive was unusual, or whether voter registration drives aimed at either Hispanics or non-Hispanics occurred at other times in the period he examines. Therefore, there is no evidence that registration behavior during these last three months was categorically different from that during the rest of the period under study.

Dr. Lanier's regression analyses are based on data which estimate the numbers of Hispanic and non-Hispanic registrations in each Arizona county, in each month of the years 2000 through 2006 and in January through July of 2007.³

As Dr. Lanier explains on page 5 of his report, his regressions include 15 binary “dummy” variables, one for each county. These binary variables represent the possibility that average registrations levels vary from county to county.

These binary variables are labeled “COUNTY_ID 1” through “COUNTY_ID 15” in the regressions of Dr. Lanier's Appendix B. For technical reasons, only 14 of these variables are necessary. The regressions in Dr. Lanier's Appendix B ignore the binary variable for the fifteenth county, “COUNTY_ID 15”.

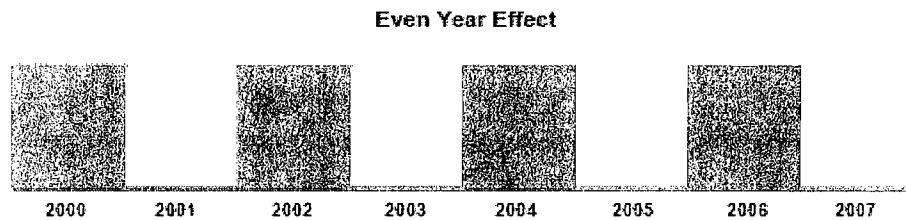
Dr. Lanier also includes a binary variable for each month to represent the possibility that average registrations levels vary from month to month. These twelve variables are labeled “month 1” through “month 12” in the regressions of Dr. Lanier's Appendix B. As with the binary variables for counties, only 11 of the binary variables for months are necessary. The regressions in Dr. Lanier's Appendix B ignore the binary variable for the twelfth month, “month 12”.

Similarly, Dr. Lanier's regressions should include one binary variable for each year to represent the possibility that average registration levels vary from year to year. This would amount to eight binary variables, of which seven would be necessary.

³ Dr. Lanier's first regression combines Hispanic and non-Hispanic registrations. It is based on 1,348 observations, each representing one county in one month. However, his second regression, analyzing Hispanic registrations only, is based on only 1,302 observations. His third regression, analyzing non-Hispanic registrations only, is based on 1,346 observations. Dr. Lanier offers no explanations for these discrepancies. They raise the possibility that he has made errors in the construction of his data. Any such errors might further invalidate his analyses. The presence or extent of these errors cannot be ascertained until Dr. Lanier completes his disclosure.

However, Dr. Lanier's regressions do not include these binary variables. Instead, they characterize the variations in average registrations from year to year with only four variables.

Figure 1: Effect of binary variable for even years

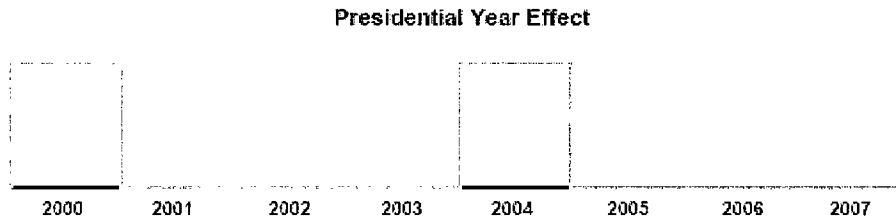


The first of these four variables is a binary variable which distinguishes average registration levels in even years from those in odd years. As Dr. Lanier states on page 5 of his report, this variable is intended to represent increases in registrations associated with elections which occur during even-numbered years.⁴ It implies that these increases are the same in all

⁴ On page 5 of his report, Dr. Lanier refers to “a set of even-year dummy variables”, implying that he intended to use more than one. However, it is evident in Appendix B of his report that he actually used only one binary variable to represent elections held in even years. Presumably, this single variable applied to all observations from 2000, 2002, 2004 and 2006.

even-numbered years. Figure 1 displays its effect on registration levels in the eight years examined by Dr. Lanier.

Figure 2: Effect of binary variable for Presidential election years

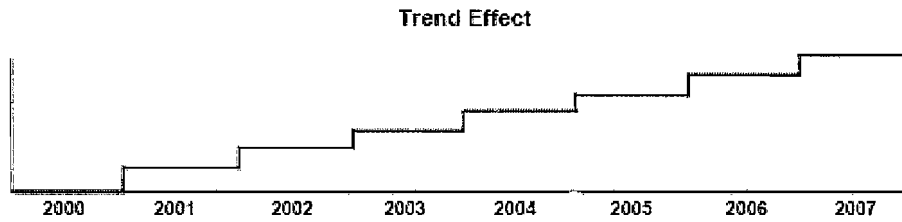


The second of these four variables is a binary variable which represents the increases in average registration levels that occur in years with Presidential elections. This variable implies that these increases are the same in all Presidential years.⁵ Figure 2 displays its effect on registration levels.

However, this cannot be verified until Dr. Lanier completes his disclosures.

⁵ On page 5 of his report, Dr. Lanier refers to “a set of presidential election year dummy variables”, implying that he intended to estimate separate registration increases for the 2000 and

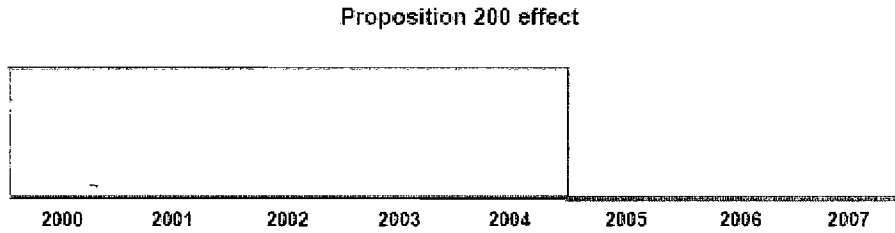
Figure 3: Effect of trend



The third of these four variables is a “time trend to account for the general trend in voter registrations” (Dr. Lanier's report, page 5). This variable implies that, apart from other effects, registrations increase from year to year by the same number. Figure 3 displays its effect on registration levels.

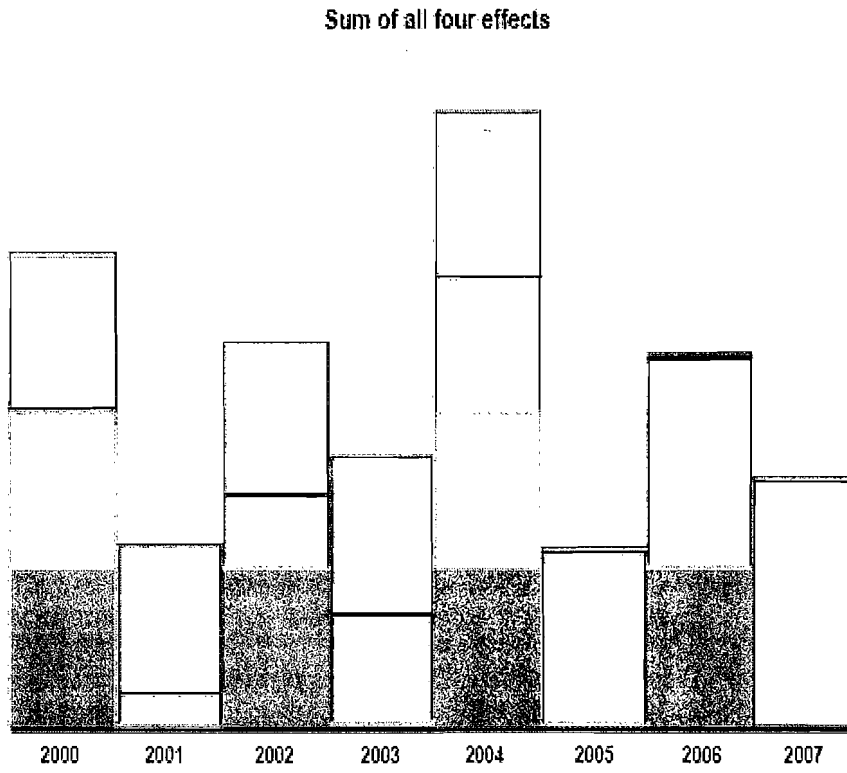
2004 Presidential elections. However, it is evident in Appendix B of his report that he actually used only one binary variable for Presidential elections. Presumably, this variable applied to both the 2000 and 2004 elections. However, this cannot be verified until Dr. Lanier completes his disclosures.

Figure 4: Effect of binary variable for post-Proposition 200 years



The fourth of these four variables is a binary variable which distinguishes the years subsequent to the implementation of Proposition 200 from those prior. In Dr. Lanier's regression, this variable indicates that, all else equal, pre-Proposition 200 registrations were higher than post-Proposition 200 registrations by the same amount in each post-Proposition 200 year. Figure 4 displays the effect of this variable on registration levels.

Figure 5: Sum of effects for even years, Presidential years, trend and post-Proposition 200 years



The sum of these four effects is the representation in Dr. Lanier's regression of the variations in registration levels that occurred across the eight years of his data. This sum yields the general pattern which is illustrated in figure 5.

Dr. Lanier's regression specification forces the regression to yield estimates of yearly variations in registrations which conform to this general pattern. If actual registrations followed any other yearly pattern, Dr. Lanier's regressions could reproduce the actual patterns only by assigning distorted effects to the four variables represented in figures 1 through 4.

It is evident in figure 5 that the use of only four variables to characterize year to year variations in registrations, rather than the seven which would be appropriate, artificially restricts the ability of Dr. Lanier's regressions to reproduce the registration patterns that might actually appear in the Arizona registration record. It is likely that the negative regression effect which Dr. Lanier reports for the period subsequent to the implementation of Proposition 200 is the consequence of this restriction, rather than an accurate estimate of the change in registrations from before to after implementation.

In more formal terms, Dr. Lanier's regressions omit the seven binary variables which would identify the distinct registration effects of each year. These regressions replace them with the four variables described in figures 1 through 4. As is well-known, the omission of important variables causes the estimated effects of the variables that remain in the regression to be biased, if the included variables are correlated with those omitted.⁶

The four variables portrayed in figures 1 through 4 are almost certainly correlated with

⁶ For an example of a discussion of this issue in an introductory econometrics text, see Gujarati (2003, page 510).

the omitted binary variables for each year. Consequently, the bias arising from the omission of these variables obscures the true effect of the implementation of Proposition 200.

This would explain the inconsistency between this regression effect and the compelling evidence in charts 1 and 2 above that Hispanic and non-Hispanic registrations were actually higher post-Proposition 200 than they were in the comparable months pre-Proposition 200.

Dr. Lanier's third and fourth claims refer to predictions derived from the remaining regression analyses in his Appendix B, in the 26th through 31st pages of his report. These regressions analyze registration patterns prior to the implementation of Proposition 200.

Charts 1 and 2 of Dr. Lanier's report each contain a green dashed line in the period subsequent to the implementation of Proposition 200. These lines represent his predictions of registrations. In each of Dr. Lanier's charts, the line representing his predictions lies almost entirely above the line representing actual registrations. In other words, he predicts that post-Proposition 200 registrations will be greater than actual post-Proposition 200 registrations.

Charts 1 and 2 of this report reproduce these green dashed lines. It is evident in these charts that the predictions represented by these lines are not related to the actual experience of Hispanic and non-Hispanic registrations in the period prior to the implementation of Proposition 200 which is comparable to the period subsequent to its implementation. Nothing in the experience of that earlier period is consistent with the exaggerated registration increases embodied in Dr. Lanier's predictions.

This suggests that Dr. Lanier's predictions rely improperly on the higher levels of pre-Proposition 200 registrations that occurred during the two Presidential elections cycles of that period, even though these cycles have no comparable periods post-Proposition 200. The

regressions which yield Dr. Lanier's predictions confirm this suggestion. They are misspecified in the same way as are those which estimate the effect of Proposition 200 on registrations. This misspecification almost certainly inflates Dr. Lanier's predictions improperly.

These regressions are based on registration data in five years, 2000 through 2004. As discussed above, these regressions, if properly specified, would include a binary variable for each of the five years, one of which would be ignored. Instead, they characterize the variations in registrations which occur from year to year using only three variables. These three variables represent the effect of even years on registrations, portrayed in figure 1 above, the effect of years with Presidential elections on registrations, portrayed in figure 2 above, and the effect of the time trend, portrayed in figure 3 above.

As discussed above, the omission of the appropriate variables and the substitution of a smaller number of inappropriate variables almost certainly causes the estimated effects of the included variables to be distorted. The distortions in these estimated effects almost certainly yield the distortions which are so clearly present in Dr. Lanier's predictions of charts 1 and 2. As these charts demonstrate, predictions of post-Proposition 200 registrations properly based on the comparable pre-Proposition 200 period would almost certainly not exceed actual registrations in the post-Proposition 200 period.

C. Incorrect tests of statistical significance

Dr. Lanier's second and fourth claims also rely on his assertions that the relevant differences are statistically significant. In footnote 4 of his report, Dr. Lanier properly emphasizes the paramount importance of statistical significance in ascertaining the reliability of conclusions

drawn from statistical analysis. However, his own calculations of statistical significance are insufficiently documented and almost certainly incorrect.

Dr. Lanier asserts (paragraph 14, pages 5-6) that “(t)he 18.5 percent difference between the Hispanic and non-Hispanic experiences is statistically significant at 5.1 standard deviations.” He does not identify the “standard deviation” in question, nor explain its derivation. However, he could not have calculated the correct standard deviation from the information that appears to be available.

As explained in Dr. Lanier's footnote 3, the difference of 18.5% is based on the different effects of Proposition 200 that his regressions estimate for registration levels among Hispanics and non-Hispanics. His regressions estimate that monthly registrations among Hispanics were reduced by 164 in the post-Proposition 200 era (page 21 of Dr. Lanier's report). His regressions estimate that monthly registrations among non-Hispanics were reduced by 773 in the post-Proposition 200 era (page 24 of Dr. Lanier's report). The difference between these two estimates, 609, estimates the difference between the decline in registrations among non-Hispanics and the decline in registrations among Hispanics.

The standard deviation of this difference is required in order to calculate the statistical significance of this difference. This standard deviation depends on the covariance of the estimated declines in Hispanic and non-Hispanic registrations.⁷ However, the estimated declines in Hispanic and non-Hispanic registrations are drawn from two different regressions. The only way to obtain the necessary covariance is to estimate these two regressions simultaneously, in a

⁷ For a more complete exposition of these issues in an introductory econometrics text, see, for example, Gujarati (2003, pages 264-265).

single procedure.⁸

Dr. Lanier obtains his regression estimates from the GLM procedure of the statistical software package SAS, as is evident from the computer outputs reproduced in his Appendix B. This procedure is not capable of estimating two regressions simultaneously.⁹

Consequently, Dr. Lanier could not have estimated the covariance between the estimated declines in Hispanic and non-Hispanic registrations. Without this essential element, the statistical significance of the difference between these declines cannot be calculated. Therefore, any claims that Dr. Lanier might have made regarding the significance of this difference would have been unfounded.

Dr. Lanier compounds this problem by focusing not on the difference between the absolute declines in Hispanic and non-Hispanic registrations, but on the difference between the estimated percentage declines in voter registration. As Dr. Lanier explains in his footnote 3, the estimated percentage decline in Hispanic registrations is the ratio of the reduction in Hispanic registrations, 164, to the average of estimated monthly Hispanic registrations, 205.

Any calculation of statistical significance involving this ratio requires the variance of this ratio. Smith (1969, page 29) asserts that the “(d)istribution of ratio estimates [is] the most intractable part of sample survey theory”. Smith (1969) and Koop (1972) are discussions of the

⁸ Statistical inference in simultaneous equation models is a sophisticated subject, not covered by introductory texts such as Gujarati (2003). For a discussion in an advanced text, see Ruud (2000, pages 727-730).

⁹ This is explicit in the documentation for this procedure. See the SAS OnlineDoc 9.1.3. at <http://support.sas.com/onlinedoc/913/docMainpage.jsp>, click on “SAS Procedures”, click on “G” in the alphabetical options, click on “GLM”, click on “Syntax” and click on “MODEL”. The documentation there states that “(y)ou can specify only one MODEL statement”.

difficulties encountered in deriving the variance of a ratio. There is no evidence in Dr. Lanier's report that he is aware of these difficulties, much less that he has surmounted them.

Consequently, it must be assumed that Dr. Lanier has not correctly calculated the variance of his estimated percentage reduction in Hispanic registrations. The same must be true of the variance of the percentage decline in non-Hispanic registration and of the covariance between these ratios. Therefore, his claims regarding the statistical significance of the difference between these estimated percentage reductions are simply not credible.

Dr. Lanier makes two further claims of statistical significance, in paragraphs 17 and 19, page 7, of his report. These claims are even more problematic than that of his paragraph 14, pages 5-6. They suffer from all of the problems discussed with regard to the first claim. In addition, these claims are in regard to differences in predicted outcomes rather than in estimated effects. The calculation of statistical significance for predicted outcomes is even more difficult than that for estimated effects.¹⁰

Once again, Dr. Lanier's report offers no hint that the difficulties are understood, much less addressed. Moreover, he claims levels of statistical significance which would be implausible in this context.¹¹ Therefore, these claims of statistical significance are also almost certainly incorrect.

¹⁰ For a more complete exposition of these issues in an introductory econometrics text, see, for example, Gujarati (2003, pages 940-947).

¹¹ In paragraph 17, Page 7, Dr. Lanier claims that "This six percent difference is statistically significant at 47.9 standard deviations." In paragraph 19, Page 7, Dr. Lanier claims that "This 8.5 percent difference between Hispanics and non-Hispanics is statistically significant at 64.1 standard deviations." As with the claim of statistical significance in paragraph 14, pages 5-6, Dr. Lanier does not identify the standard deviations to which he refers, nor does he provide details of the calculations by which they were computed.

II. Review of “Written Report of Dr. Rodolfo Espino with respect to the effects of Proposition 200 on Arizona’s Hispanic population”

Dr. Espino's report examines the proportion of new voter registrants in Arizona who were Hispanic over the period from 4 June 2002 to 31 July 2007. He concludes that the racial composition of registrants varies over this period (pg. 2). He also concludes that the shares of Hispanics among registrants in Greenlee County and in Yuma County were lower at the end of this period than at the beginning (pg. 6). Lastly, he intimates, but does not conclude, that the effects of registration requirements in Proposition 200 were not neutral with respect to the proportion of registrants who were Hispanic.

Dr. Espino's evidence cannot be verified because he has not fully disclosed the data and methods by which he constructed them. However, his conclusions are suspect, regardless. They are based on improper comparisons between noncomparable time periods and have no statistical support.

A. Noncomparable time periods

The period examined by Dr. Espino encompasses 941 days prior to, and 941 days subsequent to the implementation of Proposition 200 on 1 January 2005. However, as discussed in the review of Dr. Lanier's report, a Presidential election occurred in early November of 2004. Therefore, the pre-Proposition 200 period studied by Dr. Espino includes this election and the approximately two years and five months which preceded it. The post-Proposition 200 period studied by Dr. Espino consists of the approximately two years and seven months which followed this election, with a two month lag.

Therefore, Dr. Espino's pre- and post-Proposition 200 periods encompass opposite ends of the Presidential electoral cycle. As discussed in the review of Dr. Lanier's report, registration behavior varies systematically through this cycle. Therefore, Dr. Espino's comparisons of registration behavior in his pre- and post-Proposition 200 periods confound any differences in this behavior which might have been induced by Prop 200 with the palpable differences in this behavior associated with different points in the Presidential electoral cycle.

Chart 3: Figure 1 from Dr. Espino's report, modified

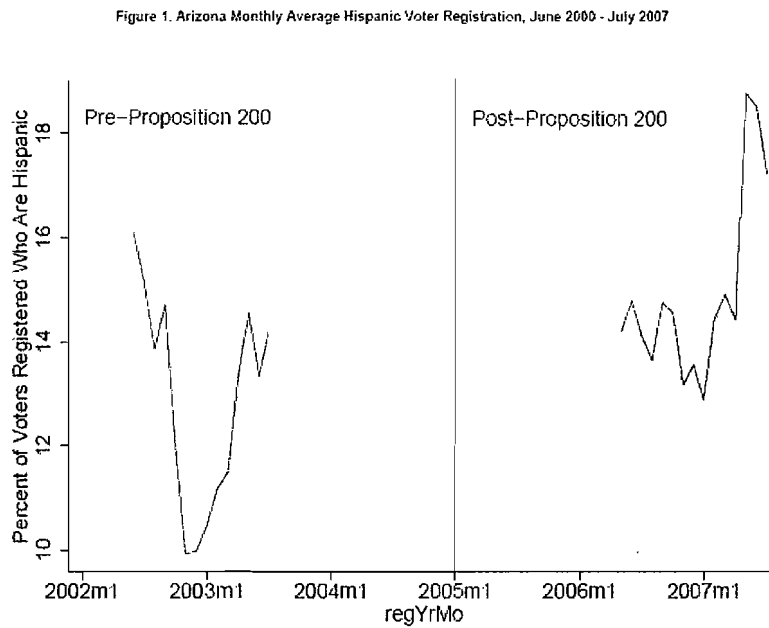


Chart 3 demonstrates the consequences of this mismatch in electoral cycles for Dr. Espino's analysis. It reproduces figure 1 from his report, with modifications to ensure that comparisons before and after the implementation of Proposition 200 are valid.

Dr. Espino's post-Proposition 200 period ends 17 months before 1 January, 2009. Therefore, the 17 months of his pre-Proposition 200 period prior to 1 January, 2005, have no comparable period after the implementation of Proposition 200. Chart 3 deletes them.

Similarly, Dr. Espino's pre-Proposition 200 period begins 17 months after 1 January 2001. Consequently, the first 17 months of his post-Proposition 200 period, starting with 1 January 2005, have no comparable period prior to the implementation of Proposition 200. Chart 3 deletes them as well.

Consequently, the two periods which remain in Chart 3 both begin approximately nineteen months after the preceding Presidential election, and both end approximately fifteen months before the next Presidential election. The pre-Proposition 200 period runs from approximately June 2002 through approximately July 2003. The post-Proposition 200 period runs from approximately June 2006 through approximately July 2007.

In chart 3, it is evident that the average proportion of Hispanics among registrants was markedly higher in the post-Proposition 200 period than in the comparable period prior to the implementation of this Proposition. This proportion never fell below 13% in the later period, was typically between 14% and 15%, and peaked toward the end of the period above 18%.

In contrast, the proportion of Hispanics among registrants in the comparable pre-Proposition 200 period was almost always below 14%. It was above this threshold at the beginning of the period and returned to it at the end. However, during the middle of this period it

dropped to only 10%.

This contrast is not as readily apparent in figure 1 of Dr. Espino's report. The principal reason is that this figure improperly includes the Presidential election of 2004 in the pre-Proposition 200 comparison period and the post-election period in the post-Proposition 200 comparison period. The share of Hispanics among all registrants peaked strongly just prior to this election, and then fell substantially in its aftermath. This may suggest that Hispanics simply accelerated their registrations in advance of this Presidential election, perhaps because it was of heightened interest.

Regardless, there is nothing in figure 1 of Dr. Espino's report to suggest that the Hispanic proportion of registrants fell after the implementation of Proposition 200. To the contrary, comparisons across comparable pre- and post-Proposition 200 periods, as in the corrected figure 1 given in chart 3 above, indicate that this proportion increased, instead.

Figure 3 of Dr. Espino's report provides the same information as in figure 1, but for each of the fifteen counties in Arizona instead of for the State as a whole. On the basis of this figure, Dr. Espino, draws the conclusion that the proportions of Hispanics among registrants fell over the period he examines in Greenlee and Yuma Counties. As in figure 1 of Dr. Espino's report, the comparisons in his figure 3 are contaminated by the inclusion of periods in each of the pre- and post-Proposition 200 periods which have no comparable period in the other.

The adjustment made to Dr. Espino's figure 1 in chart 3 above, applied to the chart for Greenlee County in Dr. Espino's figure 3, would delete the periods of relatively high Hispanic registration in the beginning and end of the pre-Proposition 200 period, and the period of relatively low Hispanic registration at the beginning of the post-Proposition 200 period. The

remaining pre- and post-Proposition 200 periods, representing comparable portions of the Presidential election cycle, would very likely show no decline in the proportion of Hispanics among registrants. The same adjustment would probably yield the same conclusion for Yuma County.

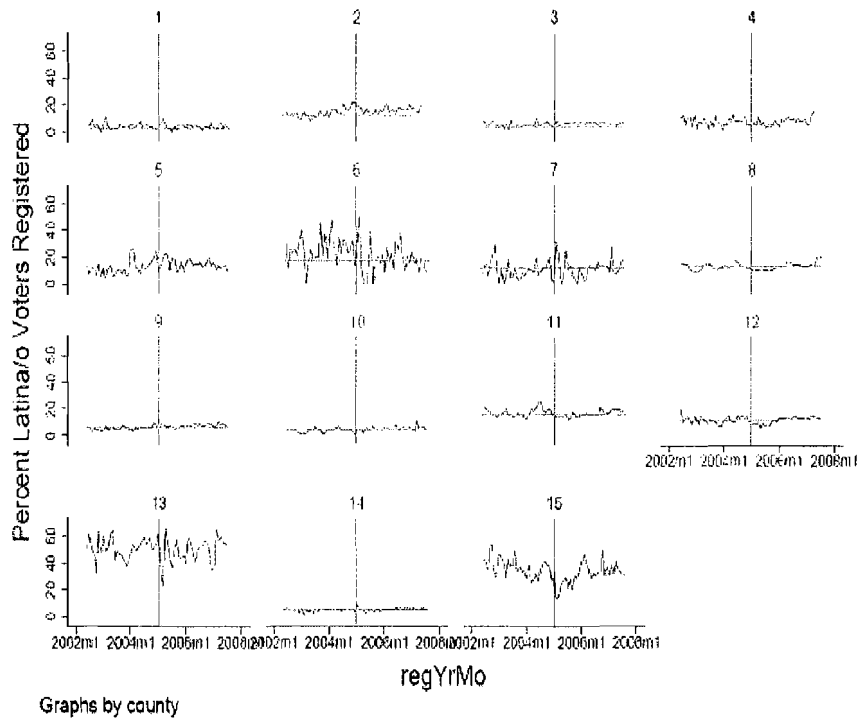
B. Absence of statistical support

Apart from the distortions arising from comparisons among non-comparable periods, Dr. Espino's conclusions do not have any statistical foundation. For example, he makes no effort to determine if the fluctuations from month to month in the proportion of registrants who are Hispanic are large enough to be statistically significant, either for the State as a whole or for any of the individual Counties.

Dr. Espino's conclusions regarding the alleged decline in the Hispanic proportion of registrants in Greenlee and Yuma Counties are based only on casual inspection of his figure 3. These conclusions could be tested rigorously by simple regression analysis, applied to the data for each county represented in figure 3. This would demonstrate whether the tendencies in Hispanic shares of registrants over time in any of these counties were towards decline, constancy or increase. Dr. Espino's failure to provide a demonstration such as this further undermines the credibility of his claims.

Chart 4: Figure 3 from Dr. Espino's report, modified

Figure 3. Arizona Monthly Average Hispanic Voter Registration, June 2000 - July 2007, by County on Same Scale



These regressions cannot be performed here because Dr. Espino has not fully disclosed his data and methods. Instead, chart 4 presents an informal attempt to anticipate the results of such regressions. This attempt ignores the problem of comparing noncomparable parts of the Presidential election cycle pre- and post-Proposition 200, in an attempt to simulate the results that Dr. Espino might have obtained, had he offered statistical evidence rather than casual impressions.

As Dr. Espino writes (pg. 5): “If the threshold to registering to vote is experienced equally by all individuals irrespective of race or ethnicity, then we should see straight lines across these monthly average plots.” Chart 4 overlays straight lines on each of these plots. These lines provide a reference point against which to visually assess the general trend in the proportion of registrants who are Hispanic within each county.

For example, the horizontal lines for Counties 1 (Apache), 3 (Coconino), 8 (Maricopa), 9 (Mohave), 10 (Navajo) and 11 (Pima) seem to coincide very closely with the pattern of estimated variations in the percentages of Hispanics among registrants. The patterns in counties 4 (Gila), 7 (La Paz), 12 (Pinal), 13 (Santa Cruz) and 14 (Yavapai) show more volatility, but their general adherence to the horizontal line suggests that this volatility would not be statistically significant. The pattern in County 15 (Yuma) suggests first a decline and then an increase in the percentage of Hispanics among registrants, but overall would probably be again summarized by a horizontal regression line. These comparisons indicate that, in these twelve counties, the percentages of Hispanics were effectively constant over the period studied.

In contrast, the percentages of Hispanics among registrants appear to trend slightly up, relative to the horizontal line, in Counties 2 (Cochise) and 5 (Graham). Only in County 6

(Greenlee), is there any suggestion that this percentage was consistently above the horizontal line in the pre-Proposition 200 period and below it in the post-Proposition 200 period.

In sum, even ignoring the impropriety of comparing the entire pre- and post-Proposition 200 periods examined in Dr. Espino's work, his own data suggest that there were essentially no meaningful trends in the proportion of Hispanics among registrants in twelve of Arizona's fifteen counties. There may have been a downward trend in one of the remaining three, but the trend in the other two was probably upward. Consequently, there is no support for the intimation that the Hispanic proportion of all registrants declined after the implementation of Proposition 200.

III. Review of “Expert report of Dr. Jorge Chapa”

Dr. Chapa's report contains a number of tabulations regarding economic and demographic characteristics of the Hispanic and non-Hispanic populations in Arizona. On the basis of these tabulations, he concludes “that Arizona Hispanics show disproportionately lower levels of education, income and political participation when compared to non-Hispanics in Arizona. This is a clear indication of a legacy of discrimination that directly and indirectly has prevented their full participation in the electoral process.”

This conclusion is irresponsible. The Noble Laureate James Heckman (1998, page 101) states that “(d)isparity in market outcomes does not prove discrimination in the market.” To the contrary, responsible claims of discrimination require either direct evidence of discriminatory behavior or careful demonstrations that disparate outcomes do not have other explanations. Dr. Chapa provides neither.

These criteria have been recognized in the scientific literature since at least the 1957 publication of The Economics of Discrimination, by the Nobel Laureate Gary S. Becker.¹² They are routinely addressed in introductory textbooks such as Kimenyi (1995, chapter 9), Wolff (1997, part IV), Blau, Ferber and Winkler (2002, chapter 7), Hoffman and Averett (2005, chapters 8, 9 and 10), Jacobsen (2007, chapter 9) and Schiller (2008, chapters 11 and 12). Cahuc and Zylberberg (2004, 280-295) discuss them in the context of an advanced textbook. Cain (1986) and Altonji and Blank (1999) provide authoritative reviews of the literature and, more importantly, the methodology. There can be no scholarly excuse for ignoring this well-established scientific tradition.

Cain (1991, page 115) concludes “that evidence based on statistical analysis is necessary but not sufficient for establishing the presence of economic discrimination. It must be supported by historical and institutional evidence and interpreted within a theoretical framework.” Dr. Chapa has singularly failed to provide this support. Therefore, his conclusion is not credible.

IV. Review of “Preliminary report of Dr. Richard L. Engstrom”

Dr. Engstrom purports to analyze the voting preferences of Latino and non-Latino voters in seven electoral contests held in Arizona. He concludes that (paragraph 11, page 6) “(t)he results of the analyses of these elections indicate that voting has been racially polarized.”

Dr. Engstrom's evidence cannot be verified because he has not fully disclosed the data

¹² See the second edition of this monograph, Becker (1971).

that he uses, methods by which he constructed them or the details of his analysis. However, his conclusions are suspect, regardless. They are not supported by his own results, which he himself does not seem to trust. Moreover, he has misrepresented the legal status of the methodology which he appears to have chosen and has ignored overwhelming scientific evidence demonstrating that this methodology is invalid.

Paragraph 9, page 5 of Dr. Engstrom's report contains a lengthy list of problems with the data that he analyzes. Without further evidence, these problems are of sufficient magnitude as to cast substantial doubt on the credibility of his analysis.

Disregarding this issue, Dr. Engstrom's results indicate that Latino and non-Latino voters cast majorities for the same candidate in three of his seven contests, those for U.S. House District 4 and U.S. House District 6 in the General Election of 2006, and that for U.S. House District 4 in the General Election of 2004. No conclusion is possible for the U.S. House District 2 contest in the General Election of 2004 because Dr. Engstrom presents no evidence regarding the voting preferences of Latino voters. Therefore, at best, Dr. Engstrom has three elections in which Latino and non-Latino voters agreed, and three in which they did not.

The Random House Dictionary of the English Language, Unabridged Edition (1966), defines "polarization" as "the production or acquisition of polarity". It defines "polarity" as "the presence or manifestation of two opposite or contrasting principles or tendencies". It defines "opposite" as "contrary or radically different in some respect common to both". It defines "contrasting" as "opposite in nature or character; diametrically or mutually opposed". In other words, "polarization" requires a substantial degree of opposition.

These definitions are consistent with the Supreme Court's usages of these terms in its

decision in *Thornburg v. Gingles*. For example, the evidence that the Supreme Court relied upon in overturning several multi-member legislative districts demonstrated very high levels of cohesion among blacks and whites, for opposing candidates:

“Finding of political cohesiveness of black voters and existence of a white voting bloc, supporting claims that use of multimember districts impermissibly diluted black voting strength in violation of section 2, was supported by evidence of black support for black candidates in excess of 70% in both primary and general elections, that an average of 81.7% of white voters would not vote for any black candidate in the primary elections, and that two-thirds of the white voters would not vote for a black candidate even after he won the Democratic primary.” (*Thornburg v. Gingles*, 2754, numbered paragraph 15).

The Court interpreted these results as indicating

“that blacks **strongly** supported black candidates while, to the usual detriment of black candidates, whites **rarely** did support black candidates” (*Thornburg v. Gingles*, 2754, numbered paragraph 16, bolding emphasis added).

The Supreme Court concluded:

“*Finally*, the court considered the extent to which voting in the challenged districts was racially polarized. Based on statistical evidence presented by expert witnesses, supplemented to some degree by the testimony of lay witnesses, the court found that all of the challenged districts exhibit severe and persistent racially polarized voting.” (*Thornburg v. Gingles*, 2761).

In sum, the Supreme Court ruling that racial polarization was present in *Thornburg v. Gingles* was predicated on evidence which it took to indicate average levels of cohesion among blacks “in excess of 70%” and average levels of white bloc voting of 81.7% in primaries and at least two-thirds in general elections. It characterized blacks as “strongly” cohesive and whites as “rarely” voting for black-preferred candidates. Dr. Engstrom’s evidence, in which Latino and non-Latino voters agree in one-half of his contests, clearly does not reach this standard.

Moreover, among the three contests in which Dr. Engstrom would claim that the Latino and non-Latino voters disagreed, his estimates of voting preferences are impossible in two. He

estimates that -37.1% of all non-Latino voters voted for Richard Miranda for State Senate District 13, and that 120% of Latino voters voted for Earl Wilcox for State Senate District 14 in the Democratic Primary of 2004.

The results for these contests must certainly be suspect. Discarding them, and the contest for the U.S. House District 4 in the General Election of 2004, in which Dr. Engstrom estimates a Latino majority of 134.4% for Pastor, leaves Dr. Engstrom with only three contests in which he estimates voting preferences for both Latinos and non-Latinos that are not impossible. Latino and non-Latino voters cast majorities for the same candidate in two. This is hardly evidence of racial polarization. If anything, it is racial concord.

Dr. Engstrom claims (paragraph 7, pages 3-4) that his statistical procedure was “approved by the United States Supreme Court in [sic] for this purpose [analyzing possible instances of racial polarization] in *Thornburg v. Gingles*”. In fact, the Supreme Court decision in *Thornburg v. Gingles* contains no explicit endorsement and no discussion of the scientific merit of the techniques which produced the evidence that it reviewed in that case. It contains only the observation that “The District Court found both methods standard in the literature for the analysis of racially polarized voting.” (*Thornburg v. Gingles*, footnote 20).

Dr. Engstrom’s method of “ecological regression analysis” may have been “standard in the literature” in 1985. However, it is now understood to be scientifically invalid. Zax (2005) analyzes the properties of Dr. Engstrom’s method in contests with two racial groups and two candidates. This analysis proves that Dr. Engstrom’s estimates of cohesion have none of the statistical properties ordinarily required by scientific inquiry. It demonstrates further that, in up to 50% of simulations with no racial polarization, Dr. Engstrom’s method nevertheless claims

that it is present. In simulations with racial polarization, Dr. Engstrom's method regularly understates its extent.

To use the language of the Supreme Court decision in *Thornburg v. Gingles*, the method that is currently "standard in the literature for the analysis of racially polarized voting" is that presented by King (1997). Dr. Engstrom, in footnote 3 of his report, envisions further analyses in which he will employ this method. Until he does so, there is no credible evidence of racial polarization.

V. Summary

The reports by Drs. Lanier, Espino, Chapa and Engstrom are distinguished by incomplete disclosure, casual analysis and unsupported conclusions. In addition, those by Drs. Chapa and Engstrom ignore well-established standards of scientific inquiry.

The most compelling interpretation of Dr. Lanier's results is that Hispanic registration levels were higher after the implementation of Proposition 200 than they were before. Dr. Espino's report demonstrates that the Hispanic proportion of voter registrations was at least as high in the post-Proposition 200 period as it was in the pre-Proposition 200 period, and possibly higher. Dr. Chapa identifies a number of disparities between the Hispanic and non-Hispanic populations, but no evidence of discriminatory origins. Lastly, Dr. Engstrom, to the extent that his results can be trusted, identifies two contests in which Latino and non-Latino voters cast majorities for the same candidate, and only one in which they disagree.

References

- Altonji, Joseph G. and Rebecca M. Blank (1999) "Race and gender in the labor market", chapter 48 in the Handbook of Labor Economics, Vol. 3, O. Ashenfelter and D. Card, eds., Elsevier Science B.V.
- Becker, Gary S. (1971) The Economics of Discrimination, Second Edition, University of Chicago Press.
- Blau, Francine D., Marianne A. Ferber and Anne E. Winkler (2002) The Economics of Women, Men, and Work, Fourth Edition, Prentice Hall.
- Cain, Glen G. (1986) "The economic analysis of labor market discrimination: A survey", chapter 13 in the Handbook of Labor Economics, Vol. 1, O. Ashenfelter and R. Layard, eds., Elsevier Science B.V.
- Cain, Glen G. (1991) "The uses and limits of statistical analysis in measuring economic discrimination", in Essays on the Economics of Discrimination, E. P. Hoffman, ed., W.E. Upjohn Institute for Employment Research, pages 115-144.
- Cahuc, Pierre and Andre Zylberberg (2004) Labor Economics, MIT University Press.
- Gujarati, Damodar N. (2003) Basic Econometrics, Fourth Edition, McGraw-Hill Irwin, Boston.
- Heckman, James (1998) "Detecting discrimination", The Journal of Economic Perspectives, Vol. 12, No. 2, Spring, 101-116.
- Hoffman, Saul D. and Susan L. Averett (2005) Women and the Economy: Family, Work and Pay, Pearson Addison-Wesley.
- Jacobsen, Joyce P. (2007) The Economics of Gender, Third Edition, Blackwell Publishing.
- Kimenyi, Mwangi S. (1995) Economics of Poverty, Discrimination, and Public Policy, South-Western College Publishing.
- King, Gary (1997) A Solution to the Ecological Inference Problem: Reconstructing Individual Behavior From Aggregate Data, Princeton University Press, Princeton.
- Koop, J.C. (1972) "On the derivation of expected value and variance of ratios without the use of infinite series expansions", Metrika, vol. 19, No. 1, December, pages 156-170.
- Perkins, R. Colby (1993) "Evaluating the Passel-Word Spanish surname list: 1990 Decennial Census Post Enumeration Survey results", Population Division Working Paper No. 4, Population Division, U.S. Bureau of the Census, Washington, D.C.

Ruud, Paul (2000) An Introduction to Classical Econometric Theory, Oxford University Press, New York.

Schiller, Bradley R. (2008) The Economics of Poverty and Discrimination, Tenth Edition, Pearson Prentice Hall.

Smith, H. Fairfield (1969) "Approximate formulae for bias and variance of ratios", The American Statistician, Vol. 23, No. 4, October, pages 29-31.

Wolff, Edward (1997) Economics of Poverty, Inequality and Discrimination, South Western College Publishing.

Zax, Jeffrey S. (2005) "The statistical properties and empirical performance of double regression", Political Analysis, Vol. 13, No. 1, January, 57-76.

Appendix A: CV for Jeffrey S. Zax

15 February 2008

CURRICULUM VITAE

Jeffrey S. Zax

University of Colorado at Boulder
Dept. of Economics
Campus Box 256
Boulder, Colorado
80309-0256
(303) 492-8268
FAX: (303) 492-8960
e-mail: zax@colorado.edu
website: <http://www.colorado.edu/Economics/Zax/>

1232 Detroit St.
Denver, Colorado
80206-3330
(303) 399-0077
FAX: (303) 399-6616

Appointments

Hunan University:

Adjunct Professor, December 2007 to present

Department of Economics, University of Colorado at Boulder:

Associate Chair, Undergraduate Program, August 2006 to present

Professor, August 1996 to present

Associate Professor, August 1990 through August 1996

Department of Economics, The Graduate School and University Center, City University of New York:

Associate Professor, September 1989 through August 1991

Assistant Professor, March 1985 through August 1989

Department of Economics, Queens College, City University of New York:

Associate Professor, September 1989 through August 1991

Assistant Professor, January 1984 through August 1989

Lecturer, September 1983 through January 1984

National Bureau of Economic Research:

Research Economist, September 1983 through August 1991

Education

Ph.D. June, 1984 in Economics, Harvard University

B.A. June, 1976 Magna Cum Laude in Economics, Harvard University

Papers in Refereed Journals

Zax, Jeffrey S. (2005) "The statistical properties and empirical performance of double regression", Political Analysis, Vol. 13, No. 1, January, 57-76.

Mocan, H. Naci, Erdal Tekin and Jeffrey S. Zax (2004) "Demand for medical care in urban China", World Development, Vol. 32, No. 2, February, 289-304.

Li, Haizheng and Jeffrey S. Zax (2003) "Labor supply in urban China", Journal of Comparative Economics, Vol. 31, No. 4, December, 795-817.

Rees, Daniel I., Jeffrey S. Zax and Joshua Herries (2003) "Interdependence in worker productivity", Journal of Applied Econometrics, Vol. 18, No. 5, September/October, 585-604.

Zax, Jeffrey S. (2003) "Residential location theory and the measurement of segregation", Annales d'Economie et de Statistique, Special issue on Discrimination and Unequal Outcomes, Nos. 71/72, July/December, 189-219.

Zax, Jeffrey S. and Daniel I. Rees (2002) "IQ, academic performance, environment and earnings", The Review of Economics and Statistics, Vol. 84, No. 4, November, 600-616.

Zax, Jeffrey S. (2002) "Comment on 'Estimating the extent of racially polarized voting in multicandidate contests' by Bernard Grofman and Michael Migalski", Sociological Methods & Research, Vol. 31, No. 1, August, 73-84.

Lynch, Jim and Jeffrey S. Zax (2000) "The rewards to running: Prize structure and performance in professional road racing", Journal of Sports Economics, Vol. 1, No. 4, November, 323-340.

Zax, Jeffrey S. (1997) "Latent demand for urban housing in the People's Republic of China", Journal of Urban Economics, Vol. 42, No. 3, November, 377-401.

Zax, Jeffrey S. and John F. Kain (1996) "Moving to the Suburbs: Do Relocating Companies Leave Their Black Employees Behind?", Journal of Labor Economics, Vol. 14, No. 3, July, 472-504.

Zax, Jeffrey S. and Mark S. Skidmore (1994) "Property Tax Rate Changes and the Rate of Development", Journal of Urban Economics, Vol. 36, No. 3, November, 314-332.

Zax, Jeffrey S. (1994) "When is a Move a Migration?", Regional Science and Urban Economics, Vol. 24, No. 3, June, 341-360.

Zax, Jeffrey S. (1991) "The Substitution Between Moves and Quits", The Economic Journal, Vol. 101, No. 409, November, 1510-1521.

Zax, Jeffrey S. (1991) "Compensation for Commutes in Labor and Housing Markets", Journal of Urban Economics, Vol. 30, No. 2, September, 192-207.

Ichniowski, Casey and Jeffrey S. Zax (1991) "Right to Work Laws, Free Riders and Unionization in the Local Public Sector", Journal of Labor Economics, Vol. 9, No. 3, July, 255-275.

Zax, Jeffrey S. and Casey Ichniowski (1991) "Excludability and the Effects of Free Riders: Right-to-Work Laws and Local Public Sector Unionization", Public Finance Quarterly, Vol. 19, No. 3, July, 293-315.

Zax, Jeffrey S. and John F. Kain (1991) "Commutes, Quits and Moves", Journal of Urban Economics, Vol. 29, No. 2, March, 153-165.

Zax, Jeffrey S. (1990) "Race and Commutes", Journal of Urban Economics, Vol. 28, No. 3, November, 336-348.

Zax, Jeffrey S. (1990) "Reform City Councils and Municipal Employees", Public Choice, Vol. 64, No. 2, February, 167-177.

Zax, Jeffrey S. (1990) "Election Methods, Black and Hispanic Council Membership", Social Science Quarterly, Vol. 71, No. 2, June, 339-355.

Zax, Jeffrey S. and Ichniowski, Casey (1990) "Bargaining Laws and Unionization in the Local Public Sector", Industrial and Labor Relations Review, Vol. 43, No. 4, April, 447-462.

Ichniowski, Casey and Jeffrey S. Zax (1990) "Today's Associations, Tomorrow's Unions", Industrial and Labor Relations Review, Vol. 43, No. 2, January, 191-208.

Zax, Jeffrey S. (1989) "Initiatives and Government Expenditures", Public Choice, Vol. 63, No. 3, December, 267-277.

Zax, Jeffrey S. (1989) "Quits and Race", Journal of Human Resources, Vol. 24, No. 3, Summer, 469-493.

Zax, Jeffrey S. (1989) "Is There a Leviathan in Your Neighborhood?", The American Economic Review, Vol. 79, No. 3, June, 560-567.

Zax, Jeffrey S. (1989) "Employment and Local Public Sector Unions", Industrial Relations, Vol. 28, No. 1, Winter, 21-31.

Zax, Jeffrey S. (1988) "Fringe Benefits, Tax Exemptions and Implicit Subsidies", Journal of Public Economics, Vol. 37, No. 2, November, 171-183.

Zax, Jeffrey S. (1988) "Wages, Nonwage Compensation and Municipal Unions", Industrial Relations, Vol. 27, No. 3, Fall, 301-317.

Papers in Edited Volumes

Zax, Jeffrey S. and Yin He (forthcoming) "Chinese factor markets and intra-national integration", Regional Disparities in China, World Bank Press.

Zax, Jeffrey S. (2007) "Efficiency in China's urban labor markets", Chapter 10 in Urbanization in China: Critical Issues in an Era of Rapid Growth, Song, Yan and Chengri Ding, eds., Lincoln Institute of Land Policy, Cambridge, 209-234.

Zax, Jeffrey S. (2003) "Housing reform in urban China", in How Far Across the River? Chinese Policy Reform at the Millenium, Hope, Nicholas C., Dennis Tao Yang and Mu Yang Li, editors, Stanford University Press, Palo Alto, 313-350.

Zax, Jeffrey S. (2000) "The evolution of entrepreneurial activity in urban China, 1988-1995", in China's Labor Market and Problems of Employment, Wang, Yuguo and Aimin Chen, editors, The Southwest University of Finance and Economics Press, Chengdu, China, 481-500 (Chinese).

Yang, Guifang Lynn, and Jeffrey S. Zax (2000) "Gender-linked income differences in transitional urban China", in China's Labor Market and Problems of Employment, Wang, Yuguo and Aimin Chen, editors, The Southwest University of Finance and Economics Press, Chengdu, China, 566-584 (Chinese).

Li, Haizheng, and Jeffrey S. Zax (2000) "Economic transition and labor supply in urban China", in China's Labor Market and Problems of Employment, Wang, Yuguo and Aimin Chen, editors, The Southwest University of Finance and Economics Press, Chengdu, China, 217-233 (Chinese).

Zax, Jeffrey S. (1998) "Immigration, race and space", in Help or Hindrance? The Economic Implications of Immigration for African Americans, Daniel S. Hamermesh and Frank D. Bean, eds., Russell Sage Foundation, 222-252.

Zax, Jeffrey S. (1988) "The Effects of Jurisdiction Types and Numbers on Local Public Finance", in Fiscal Federalism: Quantitative Studies, Harvey S. Rosen, ed., National Bureau of Economic Research and the University of Chicago Press, 79-103.

Zax, Jeffrey S. and Casey Ichniowski (1988) "The Effects of Public Sector Unions on Payroll, Employment and Municipal Budgets", in When Public Sector Workers Unionize, Richard B. Freeman and Casey Ichniowski, eds., National Bureau of Economic Research and the University of Chicago Press, 323-361.

Freeman, Richard B., Casey Ichniowski and Jeffrey S. Zax (1988) "Collective Organization in the Public Sector", in When Public Sector Workers Unionize, Richard B. Freeman and Casey Ichniowski, eds., National Bureau of Economic Research and the University of Chicago Press, 365-398.

Published Book Reviews

Zax, Jeffrey S. (2003) "Review of Urban Inequality: Evidence from Four Cities", edited by Alice O'Connor, Chris Tilley and Lawrence D. Bobo, Journal of Economic Literature, Vol. 41, No. 1, March, 238.

Papers Under Journal Review

Lynch, James G. and Jeffrey S. Zax, "The effects of prizes on contestant selection and performance: The case of Arabian horse racing" with James G. Lynch, revisions requested by the Journal of Labor Economics.

Zax, Jeffrey S. "The statistical properties of single regression estimates of voting behavior when turnout is unknown", submitted to Political Analysis.

Zax, Jeffrey S. "Fifty years of Goodman's Identity: Its implications for regression-based inference", revisions to the American Journal of Sociology.

Zax, Jeffrey S., "Comment on 'EI extended model and the fear of ecological fallacy', by Baodong Liu", submitted to Sociological Methods and Research, 31 October 2007.

Working Papers

- “Housing allocations, welfare and inequality in early and mid-reform urban China”, December 2007.
- “Indications of market integration and efficiency in Chinese agriculture”, with Yin He, October, 2007.
- “Comment on ‘Bloc voting, polarization, and the Panethnic Hypothesis: The case of Little Saigon’, by Christian Collet”, October 2007.
- “Colorado’s Enterprise Zone Program: Impacts on Establishment–Level Employment and Earnings per Worker”, with Devon Lynch, February 2007.
- “Levels and changes in residential segregation, measured correctly”, with John Gardner, October 2004.
- “Do households vote with their feet?”, with Valeriy D. Gauzhstein, July 2004.
- “Commodification of urban Chinese housing in mid-reform”, July 2004.
- “Permanent, transitory and life-cycle inequality”, October 2002.
- “Marriage, divorce, income and military marriage incentives”, with David W. Flueck, April 2002.
- “Economic transition and the labor market in China” with Haizheng Li, March 2002.
- “Demand, supply and race in small business credit markets”, December 2001.
- “Bank credit and minority-owned small businesses in metropolitan Denver”, November 2000.
- “Gender-linked income differences in transitional urban China” with Guifang Lynn Yang, June 1999.
- “The evolution of entrepreneurial activity in urban China, 1988-1995”, May 1999.
- “ERISA, pension diversification and the welfare of workers and retirees”, with Mehmet M. Tutuncu, February 1998.
- “Fertility behavior and the absence of ‘missing females’ in urban China”, with Kathleen Greer Rossman, September 1997.

“Compensation for holding up half the sky? Gender-based income differences in urban China” with Lynn Yang, October 1996.

“Investment in education in urban China”, May 1996.

“The economic consequences of comparable worth policies”, with Kristyn N. Howard, February 1996.

“Analysis of client treatments for Colorado Child Welfare Service”, with Margaret Irish, February 1996.

“Involvement and reinvolvement: Child abuse and neglect in Colorado”, with Natalie Mullis, February 1996.

“Human capital in a workers' paradise: Returns to education in urban China”, August 1995.

“Maltreatment case loads and county characteristics in Colorado”, with Margaret Irish, May 1995.

“The stability of jobs in the local public sector”, with Jonathan S. Leonard, April 1995.

“When should economics majors take the introductory statistics course?”, with Douglas L. Jeavons and Larry D. Singell, January 1994.

“The effects of nonwage compensation on measured income distribution, income tax progressivity and returns to education”, October 1993.

“Optimal worker portfolios: Pensions, ESOPs and anti-ESOPs”, with Mehmet M. Tutuncu, May 1992.

“The effects of political voice on union formation among municipal employees”, November 1990.

“Progressive taxation and regressive subsidies: Income tax exemptions and nonwage compensation”, November 1989.

“The economic effects of function numbers in local government tiers”, July 1988.

Textbook in Progress

Introductory Econometrics: Intuition, Proof and Practice.

Service as Editor and Referee

Coeditor, Chinese Economic Review, January 2005 and continuing.

Referee for Journals: The American Economic Review, Asian Economic Journal, Contemporary Policy Issues, Economic Inquiry, Economic Journal, Economica, Economics of Governance, European Economic Review, International Economic Review, Industrial and Labor Relations Review, Industrial Relations, International Journal of Business and Economics, Journal of Applied Econometrics, Journal of Comparative Economics, Journal of Human Resources, Journal of Labor Economics, Journal of Law and Economics, Journal of Policy Analysis & Management, Journal of Political Economy, Journal of Public Economics, The Journal of Real Estate Finance and Economics, Journal of Regional Science, Journal of Sports Economics, Journal of the European Economic Association, Journal of Theoretical Politics, Journal of Urban Economics, Labour Economics: An International Journal, National Tax Journal, Papers in Regional Science, Public Choice, Public Finance Review, Publius, Regional Science and Urban Economics, Regional Science Perspectives, Review of Economics and Statistics, Review of Income and Wealth, Social Science Quarterly, Southern Economic Journal, Urban Affairs Review, Urban Geography and the World Bank Economic Review, August 1990 to present.

Referee for Foundations: National Science Foundation, Russell Sage Foundation, Research Grants Council of Hong Kong, August 1990 to present

Professional Memberships

Member of the American Economic Association

Member of the Association for Public Policy Analysis and Management

Member of the Chinese Economists Society

Member of the Society of Labor Economists

Grants

Principal Investigator, "Colorado Department of Transportation Safety Program Problem ID", State of Colorado Department of Transportation, 6/16/2006-6/15/2007.

Principal Investigator, "Colorado Department of Transportation Safety Program Problem ID and Annual Report", State of Colorado Department of Transportation, 6/16/2005-6/30/2006.

Principal Investigator, "Colorado Department of Transportation Safety Program Problem ID and Annual Report", State of Colorado Department of Transportation, 12/8/2004-6/30/2005.

Principal Investigator, "Colorado Department of Transportation Safety Program Annual Report", State of Colorado Department of Transportation, 11/5/2003-6/30/2004.

Principal Investigator, "Election Cycles, Balanced Budget Requirements and Tax Limitations in State Governments", Council on Research and Creative Work, University of Colorado, 7/1/1991-6/30/1992.

Principal Investigator, "Nonwage Compensation and Enterprise Performance", PSC-CUNY Award #668406, 7/1/1988-6/30/1989.

Principal Investigator, Social Science Research Council Dissertation Fellowship, no. SS-25-83-04, 12/1/1982-2/29/1984.

Awards and Honors

Biography included in Who's Who in Economics, 4th Edition.

Biography included in Marquis Who's Who in America, 57th and 58th editions.

Biography included in Marquis Who's Who in American Education, 6th edition.

Biography included in Marquis Who's Who in the East, 23rd edition.

Biography included in Marquis Who's Who in Finance and Business, 35th edition.

Biography included in Who's Who Among American Teachers, 2004-2005.

Biography included in International Educator of the Year 2004.

Biography included in America's Registry of Outstanding Professionals 2002-2003.

Biography included in the Directory of American Scholars, 2001.

Stanford Calderwood Teaching Excellence Award from the Department of Economics at the University of Colorado at Boulder, May 2000.

Stanford Calderwood Teaching Excellence Award from the Department of Economics at the University of Colorado at Boulder, April 1993.

Fulbright Lecturer at the University of Ghana, Legon, Ghana, January-April 1990.

Additional Experience

Consultant to the Attorney General of Arizona the statistical analysis of voting patterns, February 2008 and continuing.

Consultant to the City of Euclid, Ohio, March through August 2007.

Consultant to the Colorado Gaming Association, March 2007.

Consultant to the World Bank, May and June 2005.

Consultant to the Attorney of Adams County, April through May 2004.

Consultant to the Attorney General of South Dakota regarding the statistical analysis of voting patterns, March 2002 through June 2005.

Consultant to the State of Wyoming Legislative Service Office regarding labor market issues in the educational sector, July 2002 through November 2002.

Consultant to the Mountain States Legal Foundation regarding the statistical analysis of voting patterns, April 2002 through June 2002.

Consultant to the City of Valdez, Alaska, regarding economic integration and racial block voting, October 2001 through December 2001.

Expert witness for the Attorney General, the State of Montana, regarding racial and ethnic block voting, July 2001 through November 2001.

Consultant to the Attorney General of South Dakota regarding the statistical analysis of voting patterns, May 2000 through October 2000.

Expert witness for the Office of the Colorado State Attorney General regarding the effects of parental notification on adolescent abortions, September 1999 through June 2000.

Consultant to Sycare regarding evaluation of community mental health center performance, April 1999 through October 1999.

Consultant to BBC Research & Consulting and the State of Colorado Workforce Coordinating Council regarding evaluation of State-sponsored training programs, June 1998 through September 1998.

Consultant to the City Attorney of the City and County of Denver regarding the provision of bank credit to small minority-owned businesses, September 1997 through August 1998.

Expert witness for the Office of the Colorado State Attorney General regarding the effects of ballot position on voting behavior, March 1997 through May 1998.

Expert witness for the Attorney General, the State of Montana, regarding racial and ethnic block voting, November 1996 through August 1998.

Consultant to BBC Research & Consulting and the State of Colorado Economic Development Commission regarding the State's strategic plan for economic development, September 1996 through February 1997.

Expert witness for the Department of Attorney General, the State of Michigan, regarding variations in impacts of pollutants across ethnic groups, July 1996 through May 1997.

Consultant to the Forward Estes Park Foundation regarding local economic development issues, May 1996 through September 1996.

Consultant to the Department of Health Care Policy and Financing, Office of Public and Private Initiatives, the State of Colorado, regarding the evaluation of hospital performance, March 1996 through August 1996.

Consultant to the Department of Human Services, Office of Self Sufficiency Programs, the State of Colorado, regarding the evaluation of microentrepreneur training programs, January through September 1996 and January through August 1997

Principal contractor to the Piton Foundation for statistical analysis of child abuse incidence and treatment in Colorado, September 1994 through February 1996.

Expert witness for the Office of the Colorado State Attorney General regarding racial block voting in state legislative elections, October 1993 through June 1994.

Instructor in Introductory Mathematics for Economists, at the Economics Institute, Boulder, Colorado, August 1993.

Principal Investigator, review of econometric literature regarding the economic implications of health care reform for the Office of the Governor of the State of Colorado, April through July 1993.

Instructor in Masters' level Mathematics for Economists at the Economics Institute, Boulder, Colorado, March through May 1993.

Consultant to the Official Unsecured Creditors' Committee of Castle Pines North Metropolitan District, Colorado, regarding the effects of property tax rate increases on the rate of residential development, June 1992 through May 1993.

Advisor to the Cost and Quality Study of Early Care and Education project, at the University of Colorado at Denver Department of Economics, Spring 1992 through Fall 1994.

Instructor in Intermediate Microeconomics at the Economics Institute, Boulder, Colorado, May 1992.

Instructor in Intermediate Microeconomics and Introductory Mathematics for Economists, for the Economics Institute's program at the Ministry of Finance, Jakarta, Indonesia, May 1991.

Expert witness for the Del Valle School District, Texas, regarding the effects of different districting schemes on minority membership of the School Board, October 1990 through February 1991.

Instructor in applied econometric analysis, Institute of Economics, Chinese Academy of Social Sciences, Beijing, People's Republic of China, December 1988 and June 1990.

Appendix B: History of expert testimony for Jeffrey S. Zax

History of Expert Participation Through Deposition or Testimony

Jeffrey S. Zax, Ph.D.

15 February 2008

The United States of America v. City of Euclid, Ohio and Cuyahoga County Board of Elections, Hazeltine, United States District Court for the Northern District of Ohio, Eastern Division, Civil Action No. 1:06-CV-01652

Deposition: 25 May 2007

Testimony: 14 August 2007

Bone Shirt, et al. v. Hazeltine, et al., United States Federal District Court for the District of South Dakota, Central Division, Civil Action No. 01-3032-KES (D.S.D.)

Deposition: 19 May 2003
26 January 2004

Testimony: 26 April 2004

Planned Parenthood of the Rocky Mountains, Inc., et al., v. William Owens, et al., United States District Court for the District of Colorado, Civil Action No. 99-WM-60.

Deposition: 11 February 2000
24 February 2000
1 June 2000

Libertarian Party of Colorado, et al. v. Victoria Buckley, United States District Court for the District of Colorado, Civil Action No. 96-WM-1983.

Testimony: 26 May 1998

Earl Old Person, et al. v. Mike Cooney, et al., United States District Court for the District of Montana, Great Falls Division, Civ. No. CV-96-004-GF-PGH.

Deposition: 4 June 1997
22 August 2001

Testimony: 26 March 1998
6 November 2001

NAACP-Flint Chapter v. Engler, Circuit Court for Genesee County, State of Michigan, No. 95-38228.

Deposition: 7 February 1997
21 April 1997

Testimony: 30 April 1997

Jennie Sanchez, et al. v. State of Colorado, et al., United States District Court for the District of Colorado, Civil Action No. 93-S-963.

Deposition: 30 December 1993

Testimony: 24 March 1994

Central Bank v. Castle Pines North, et al., District Court, County of Douglas, State of Colorado, Case No. 92-CV-4433.

Depositions: 17 March 1993
12 April 1993

Enrique G. Lopez, Jr., et al. v. Del Valle Independent School District, et al., 261st District Court of Travis County, State of Texas.

Depositions: 13 November 1990
8 January 1991

Testimony: 5 February 1991