

# Cost of Living Report

## Executive Summary

We find that most (71%) graduate students at Caltech make between \$17,700 and \$22,200 in pre-tax income each year. We find a significant difference between stipends earned by U.S. citizens and those earned by visa holders. This difference cannot be explained by the availability of lucrative fellowships for U.S. citizens. Approximately 25% of students have a supplementary source of income greater than \$1000.

The average amount paid by graduate students for rent each month (per person) is \$574, and the modal amount is \$500. Students living on campus pay an average rent of \$500 per month, while students living off campus pay, on average, \$648 per month.

We recommend:

- That the minimum graduate student stipend be raised to a level such that a student pays no more than 30% of his or her gross stipend for rent;
- That ISP or another campus organization investigate the discrepancy between the stipends of U.S. citizens and visa holders, to determine if the phenomenon is real and, if so, to establish the cause;
- That faculty be aware that 37% of students report that their stipends have not increased during the past year and act to implement an annual cost-of-living increase across all divisions;
- That the effect of the recent and future increases in stipends of NSF fellowship holders be examined in coming years, and that the Institute take appropriate measures to control disparity in stipends arising from these increases.

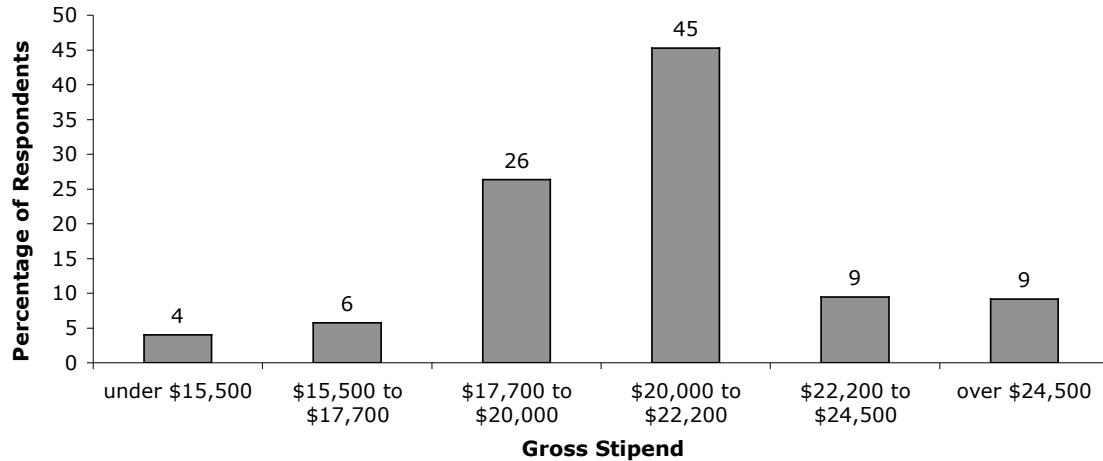
## Data

### I. Gross Stipend

The survey gave respondents five choices to the question, “In the past year, what was your gross (pre-tax) salary/stipend?” These were

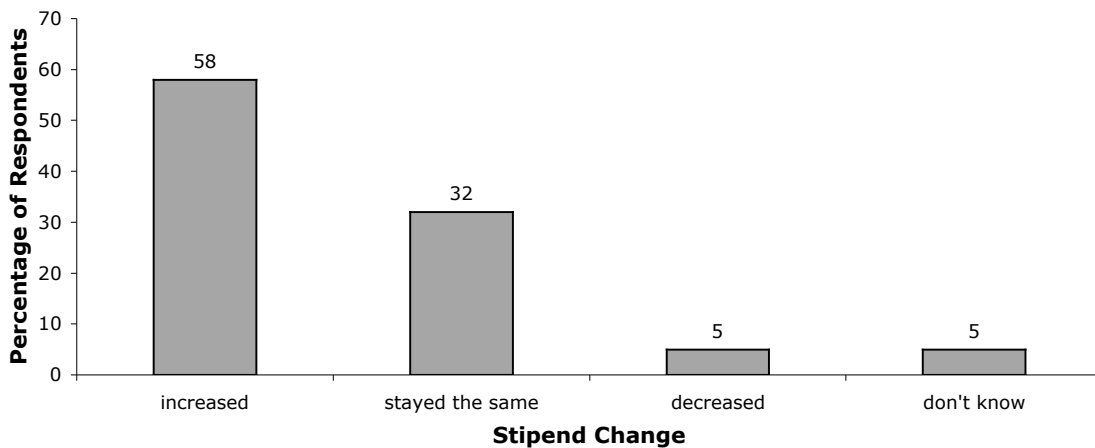
- a. under \$15,500
- b. \$15,500 to \$17,700
- c. \$17,700 to \$20,000
- d. \$20,000 to \$22,200
- e. \$22,200 to \$24,500
- f. over \$24,500

Approximately 70% of students make between \$17,700 and \$22,200 (Figure 1). 10% of students make under \$17,700, and 18% of students make over \$22,200. The labels above each column in the following figures represent the percentage of students in each category.



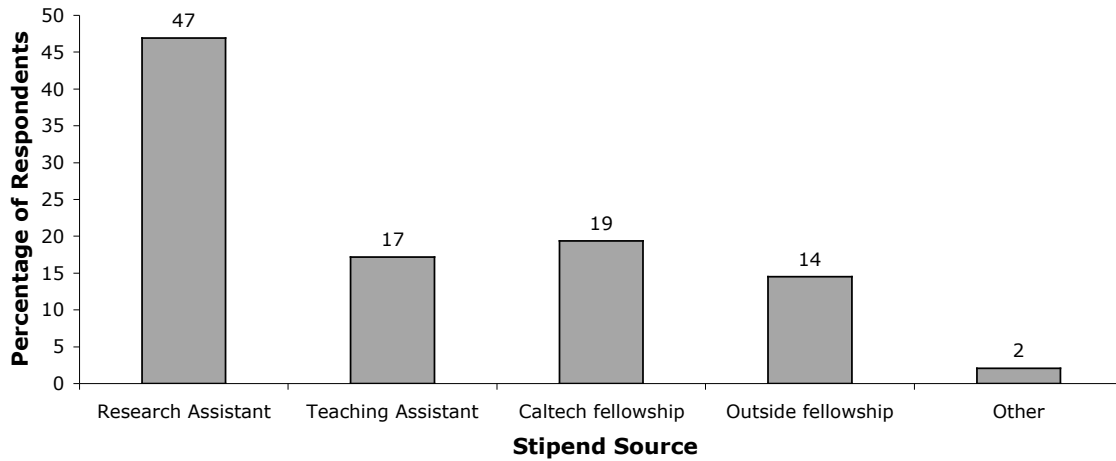
**Figure 1.** Self-reported pre-tax stipend income of graduate students.

We also asked students what happened to their stipend in the previous year. The results are shown in Figure 2. Approximately one-third of students said that their stipends had remained unchanged over the previous year; 58% reported that their stipends had increased, and 5% reported a decrease in their stipends. Students who answered “not applicable” are not represented in this figure.



**Figure 2.** Stipend change for all graduate students.

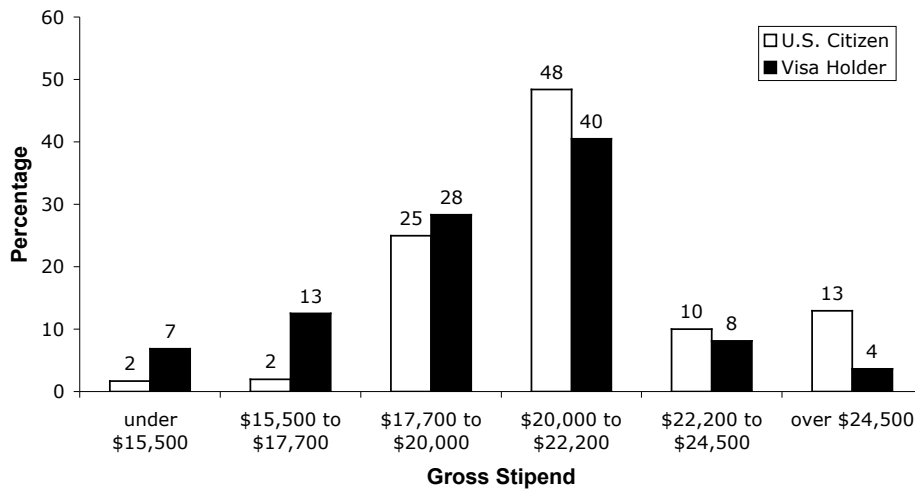
In Figure 3, the primary sources of stipend funding for graduate students in the academic year 2002-2003 are shown. The most commonly reported source of primary funding was a research assistantship. Teaching assistantships provided primary funding to 17% of respondents. Caltech-provided fellowships supported 19% of respondents, and 14% of all respondents reported that their primary source of funding was from an outside fellowship. 33% of respondents reported that they received outside fellowships (\$10,000 or more) for at least one year during their time at Caltech.



**Figure 3.** Primary source of funding in the academic year 2002-2003 for all graduate students.

Perhaps the most striking demographic trend in this data is seen when it is broken down by nationality (Figure 4). Differences in earnings between United States citizens and visa holders are significant at the  $p = 0.001$  level by chi-squared analysis. While 29% of United States citizens make under \$20,000 a year, almost half of student visa holders (48%) fall into this category. One-fifth of international students make less than \$17,700 a year. United States citizens are also far more likely to make over \$24,500 a year. (The difference in earnings in the over \$24,500 salary bracket is significant at the  $p = 0.05$  level when a z-test is used.) We thought that this difference might arise from the citizenship requirements of certain outside fellowships. However, when students with outside fellowships are excluded from the data pool, and when both students with Caltech fellowships and students with outside fellowships are excluded from the data pool, this difference remains and is significant at the  $p = 0.001$  level.

Breakdowns on stipend data by gender and by ethnicity revealed no statistically significant trends by chi-squared analysis (where “significant” was defined as having  $p = 0.05$ ). The graphs of stipend by gender and stipend by ethnicity are included in the Appendix of this document, as we felt that these breakdowns might be of interest to the Caltech community.



**Figure 4.** Gross stipend by nationality. Percentages of categories (U.S. citizens and visa holders) are given. There were a small number of permanent residents whose responses are not included.

We also compared stipend levels across divisions. The distributions differed significantly at the  $p = 0.001$  level. Biology pays its students the most, and the most consistently; 66% of biologists make between \$20,000 and \$22,200. PMA seems to have a bimodal salary distribution, with a considerable fraction of students making under \$17,700 each year. HSS was not included in this chart because the division's small size presented concerns about the reliability of the data. In all divisions except for GPS, the modal salary range is between \$20,000 and \$22,200. In GPS, students were as likely to make between \$17,700 and \$20,000 as they were to fall into the \$20,000 to \$22,000 income bracket. However, this may not reflect a difference in pay levels, as students in GPS, CCE, EAS and Bio might all make approximately \$20,000.

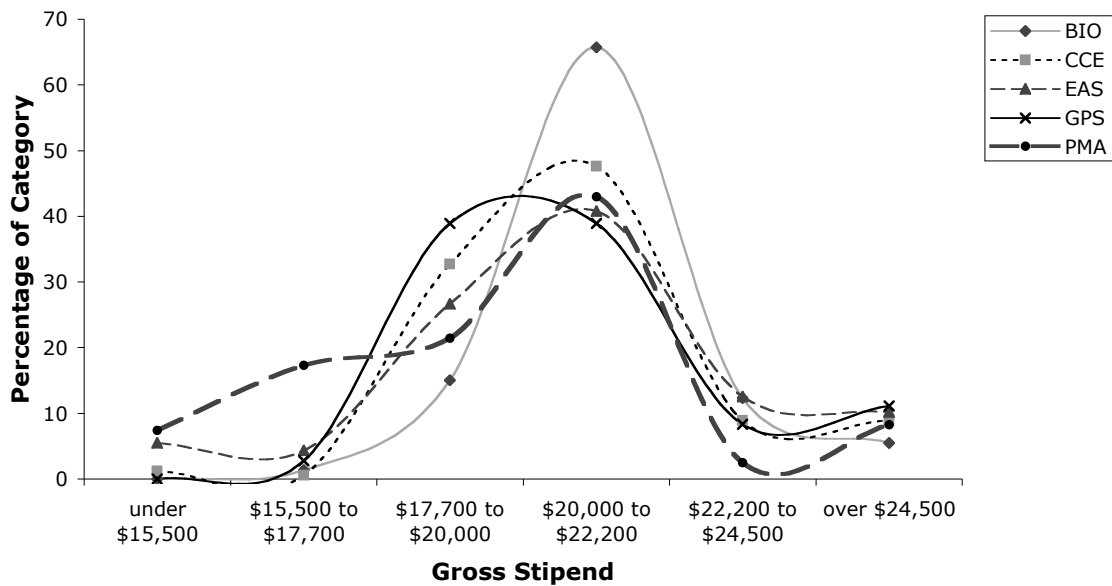
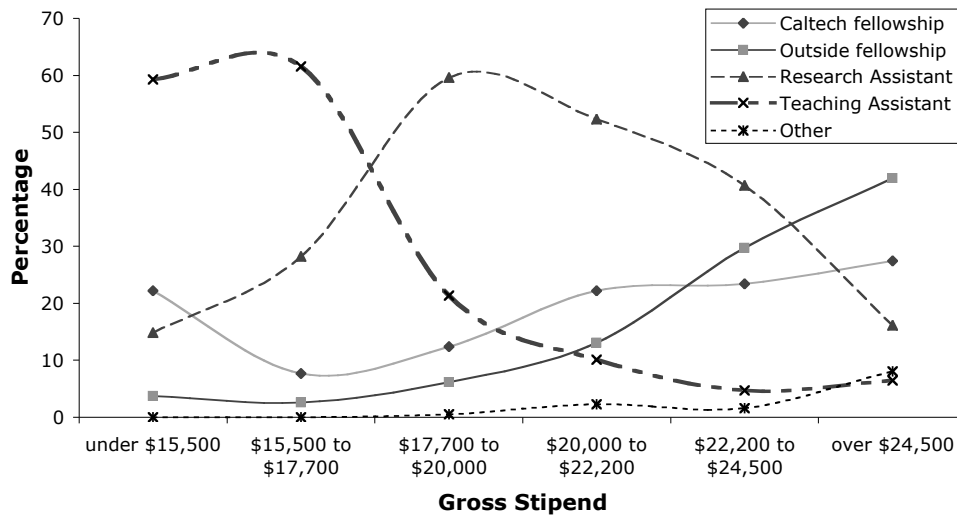


Figure 5. Gross stipend by division. Percentages are given by division. Lines are included to lead the eye and do not imply mathematical relationships between the points.

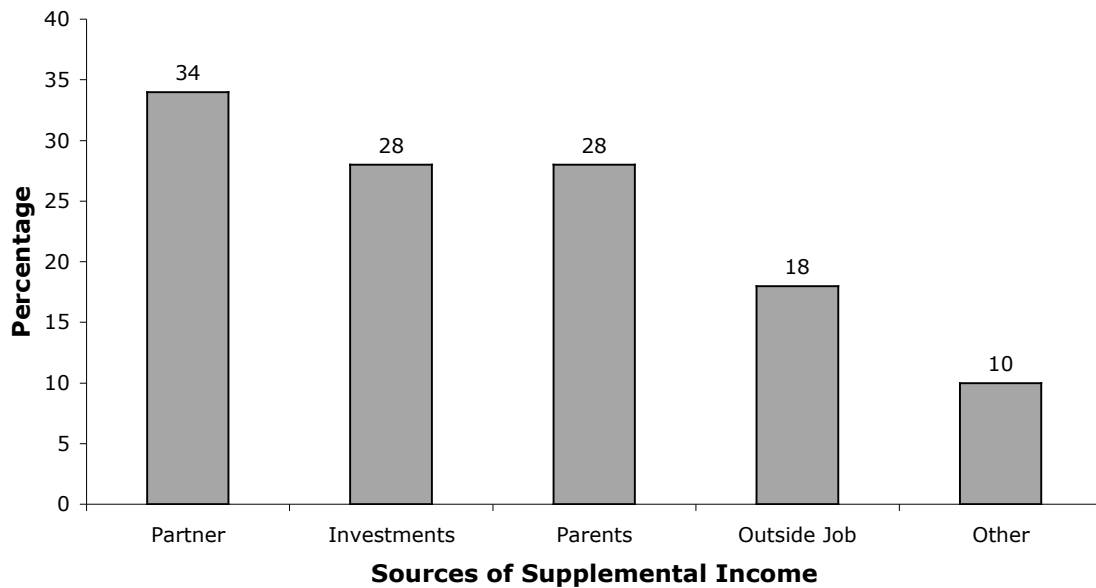
We also looked at how student stipends depended on their main source of income (Figure 6). The majority of those making under \$17,700 specify their major source of income as a teaching assistantship, and outside fellowships fund 42% of those making over \$24,500. A significant fraction of students who make over \$24,500 (43%) are funded through either Caltech fellowships or research assistantships.



**Figure 6.** Amount earned by source of stipend. Percentages are given by stipend level. Lines are included to lead the eye and do not indicate mathematical relationships between the points.

## II. Other Income

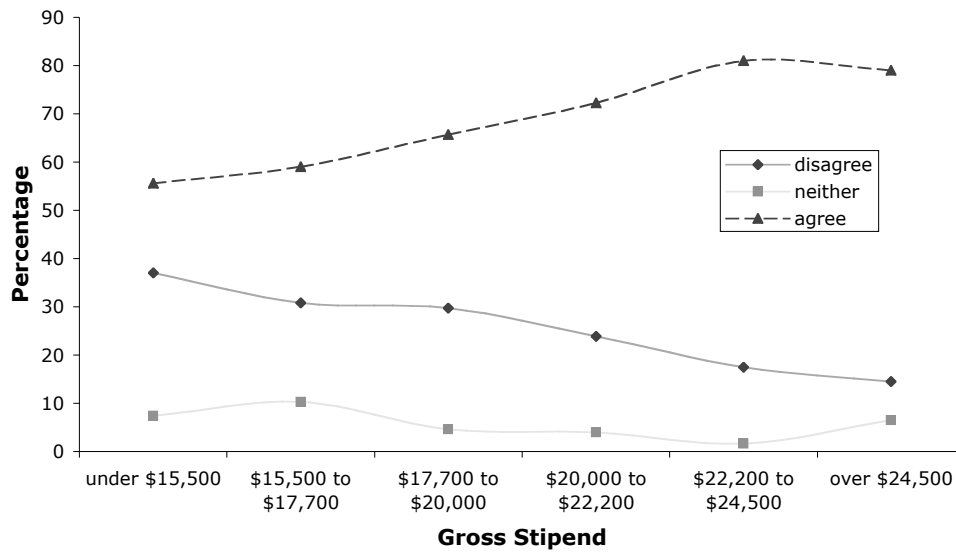
Most graduate students (74%) reported that they did not have a supplemental source of annual income providing more than \$1000. Of the 26% who reported a significant supplemental source of annual income, the sources of that income were distributed as shown in Figure 7. (Respondents had the option of choosing several sources of supplemental income.) Partners were the most common source of other income, followed by investments and parents. (Assistance from parents that is not explicitly monetary, such as payment of car insurance on behalf of a student, might not have been reported.) 4.6% of overall respondents, or 18% of those with supplemental income, reported that this income arose from an outside job, and 7.4% of overall respondents (28% of those with supplemental income) reported significant investment income.



**Figure 7.** Sources of significant (more than \$1000) supplemental income for graduate students. The percentages shown are in relation to the 26% of students reporting supplemental income sources. The percentages in the chart sum to 118% because students could indicate multiple sources of supplemental income.

### III. Student Opinion on Stipends

When asked to agree or disagree with the statement, “My stipend is adequate to cover essential living expenses,” 70% of students agreed, 25% disagreed, and 5% neither agreed nor disagreed. When these answers were broken down by stipend, they varied by stipend at the  $p = 0.07$  level of significance. (We chose  $p = 0.05$  as our cutoff value for significance, but felt this result was of sufficient interest to include in the report.) The breakdown of responses to this question is shown in Figure 8.



**Figure 8.** Answers to the question, “My stipend is adequate to cover essential living expenses,” broken down by self-reported gross stipend. Percentages are given by stipend category. Lines are included to lead the eye and do not indicate mathematical relationships between the points.

We also asked students whether they would recommend their advisors, their options, and Caltech. As measured by responses to these three questions, the satisfaction of students at Caltech is significantly correlated with the amount they earn. Those earning under \$17,700 a year were the least likely to recommend their advisor or option to other students ( $p = 0.025$  for advisor data and  $p = 0.001$  for option data). This data is shown in Figure 9 and Figure 10. Students earning under \$17,700 a year were also less likely than others to recommend Caltech to other students (this held true at the  $p = 0.053$  confidence level). Lines are included in these figures to lead the eye.

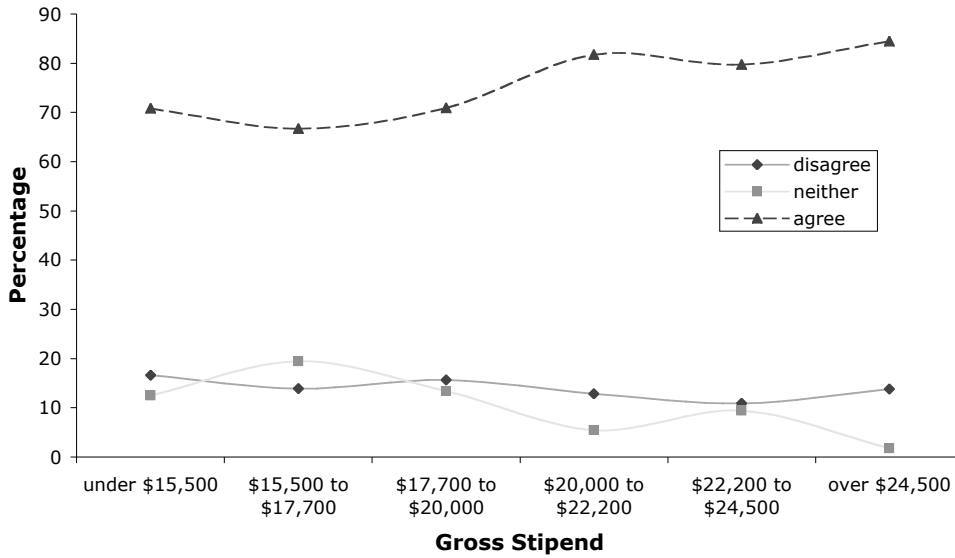


Figure 9. Answer to the question, “I would recommend my advisor to other students,” broken down by self-reported gross stipend. Percentages are by stipend category.

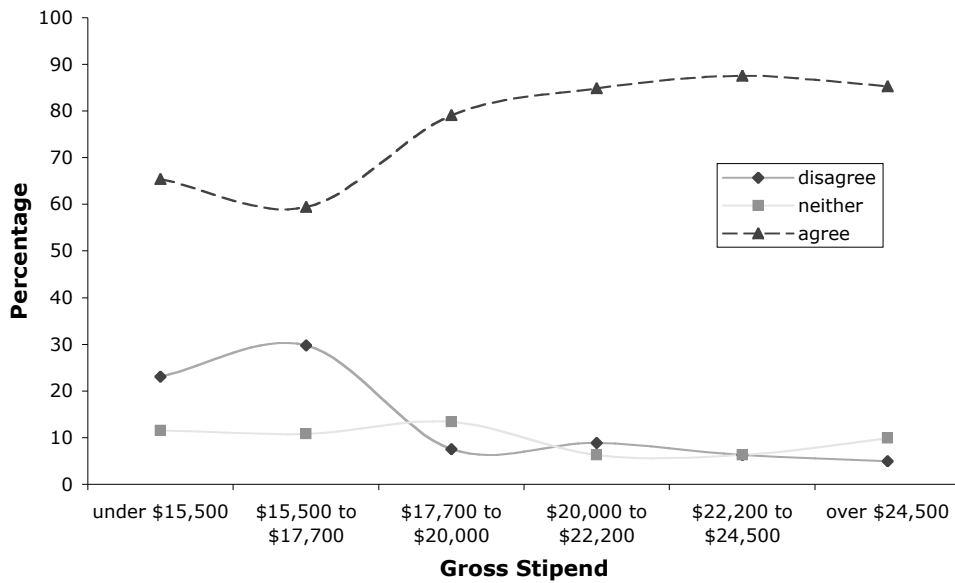


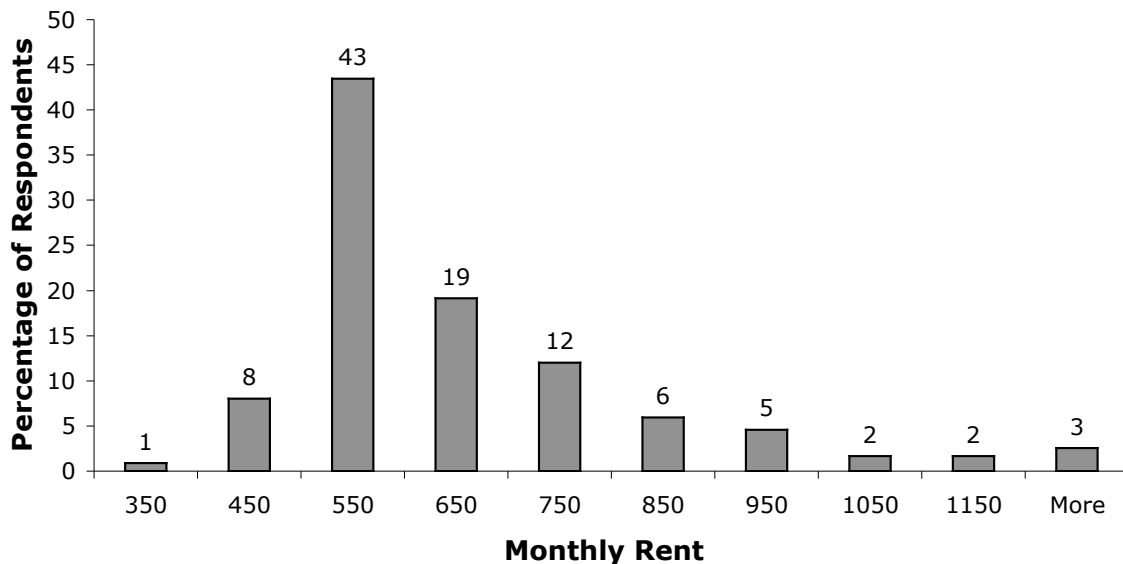
Figure 10. Answers to the question, “I would recommend my option to other students,” broken down by self-reported gross stipend. Percentages are by stipend category.

#### IV. Rent

We examined the relationship between student stipends and the rents that students pay. While most people spend a significant portion of their income on housing, those who are renting do not benefit from the appreciation of property values in the area, and are therefore incurring a large non-investment expense in their housing costs. Students typically cannot afford to buy property, and even if they can, they often do not expect to stay in the area long enough to make buying a worthwhile option.

Because rent can be a large portion of one's budget, we did some background research on general guidelines for rent. *Money* magazine recommends that no more than 30% of gross income should be spent on housing and debt.<sup>1</sup> Other financial planners available online recommend spending no more than between 25% and 30% of one's gross income on rent. The U.S. Department of Housing and Urban Development (HUD) sets rents for low-income families to be 30% of their monthly adjusted income.<sup>2\*</sup> Landlords sometimes use similar guidelines to determine whether a prospective tenant can afford to rent an apartment.

Respondents were asked how much they paid, per person, for rent each month. We excluded amounts over \$1700 (3 respondents), as well as \$0 answers. A histogram of the results is shown in Figure 11; approximately three-quarters of the respondents pay between \$500 and \$800 each month. The distribution tails toward the more expensive end of the spectrum. The modal amount paid for rent is \$500; the average value paid in rent is \$574.



\* In the year 2002, the HUD “low-income” limit for one person in Los Angeles county was \$30,850; for two people, this limit was \$35,250. The “very low income” limit was \$19,300. The median family income was \$55,100. From <http://www.huduser.org/datasets/il/fmr02/hud02ca.pdf>.

**Figure 11.** Rent paid per person each month, in dollars. "650" refers to respondents paying between \$600 and \$700 per month.

Nearly half of respondents (48.5%) said that they lived on campus. Figure 12 shows the distributions of rents paid by respondents who lived on campus and compares them to the rents paid by respondents living off campus. Rents on campus have a sharper distribution than those off campus, and are centered between \$500 and \$600 a month. The modal monthly rent of on-campus renters is \$500 a month, and the average value paid by on-campus renters is \$500. The modal monthly rent of off-campus renters is \$600 a month, and the average monthly rent of off-campus renters is \$648.

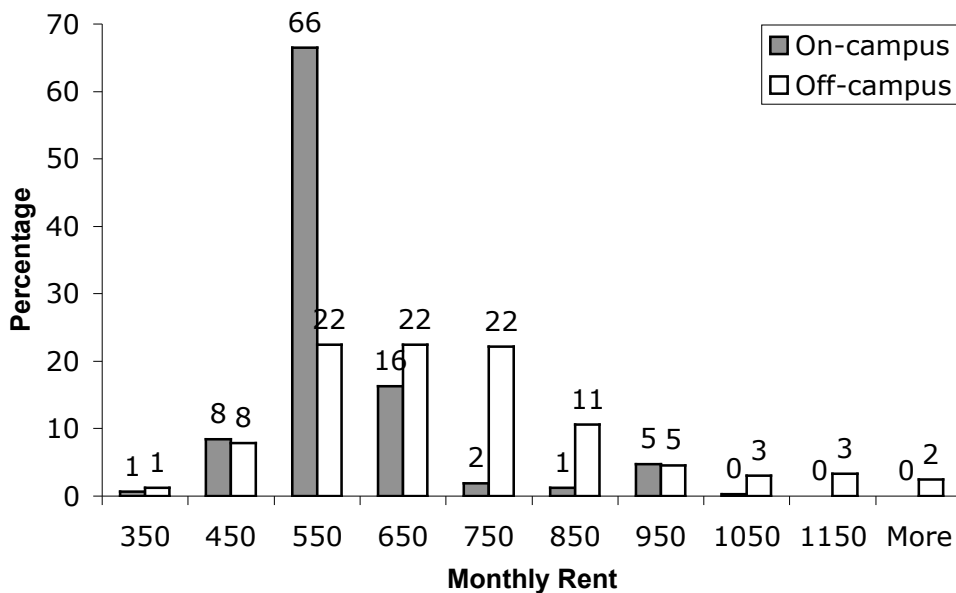


Figure 12. A comparison of rents paid by students who live on-campus and rents paid by students who live off-campus. Percentages are given by type of housing (on or off campus). "650" refers to respondents paying between \$600 and \$700 per month.

In our survey population, students making between \$15,500 and \$24,500 spend, on average, 32% to 36% of their pre-tax salary on rent. This range was calculated by determining what percentage of each respondent's salary went to the rent they reported if they earned the lowest possible salary in their income bracket (as defined by this survey) and what percentage would go to their reported rent if they earned the highest possible salary in their income bracket, and then taking the average of the high and low values. Those who made over \$24,500 and under \$15,500 were excluded from this calculation.

Students who make under \$15,500 pay an average rent of \$494 a month, with a standard deviation of \$55. The modal amount paid for rent by students who make under \$15,500 is

\$500. The post-tax stipend of a student who makes \$15,500 would be \$14,514<sup>‡</sup>, or \$1099 each month. These students are paying, on average, at least 41% of their post-tax income (or 39% of their pre-tax income) for housing.

Table 1 shows tax rates for the salary levels we used as bracketing points in our survey. Also shown is the yearly post-tax stipend and the value of 30% of the pre-tax and post-tax stipend, given as a monthly sum. These numbers represent amounts that students should be budgeting for their rents. If one assumes that 30% of a student's pre-tax stipend should go toward rent, one should earn at least \$20,000 to afford rents of \$500 per month. If one lives off campus, where the modal value paid for rent is \$600 per month, one should earn \$24,500.

**Table 1.** Tax rates for the salary levels used in our survey, according to the federal and California tax tables for 2002. We assume a single filing status, one exemption, and the stipend as the sole source of income.

Pre-Tax Stipend (Yearly)	Federal and State Tax	Post-Tax Stipend (Yearly)	30% of Pre-Tax Income (Monthly)	30% of Post-Tax Income (Monthly)
\$15,500	\$986	\$14,514	\$387	\$363
\$17,700	\$1377	\$16,323	\$442	\$408
\$20,000	\$1814	\$18,186	\$500	\$455
\$22,200	\$2232	\$19,968	\$555	\$499
\$24,500	\$2669	\$21,800	\$612	\$545

## Recommendations

No one decides to attend graduate school because they expect their student stipend to provide them with large amounts of money. However, it is important that graduate students earn enough money that their lack of funds does not have a deleterious effect on their research or their lives. Such effects can include worries about personal safety, when affordable apartments are located only in unsafe areas. Also, students who are living from paycheck to paycheck may have to go into debt when unforeseen expenses arise, such as a car repair or a dental bill.

Students should be able to pay for their housing and still be able to afford food, clothing, and other essential living expenses. For graduate students, depending on their labs and their advisors, essential expenses may include such research-related items as computers or scientific texts. It is perhaps not surprising that students in low income brackets are less likely to recommend their advisor and option, and are likely to spend a greater

<sup>‡</sup> This value is calculated using the California state and federal tax tables of 2002, assuming a single filing status, one exemption, and the stipend as the sole source of income.

percentage of their income on rent, than students making over \$17,700 a year. Of course, correlation does not imply causation, but this would be an interesting topic for further studies.

Our data show that international students are more likely to make under \$17,700 than American citizens. We recommend that ISP or another campus organization investigate the discrepancy between the salaries of U.S. citizens and visa holders. When populations of students with fellowships were removed from the data pool, the difference between U.S. citizens and international students remained highly significant.

A significant minority (37%) of students reported that their stipend had either remained constant or decreased over the past year. Although the Dean's Office modifies stipend ranges to account for cost-of-living increases, our data indicate that many students are not receiving such increases to their stipends. We would recommend implementing a small yearly increase in individual student stipends to keep up with inflation and increases in the cost of living in the Pasadena area.

The numbers we collected on rent paid per person each month show a fairly hard "wall" at \$500 per month, indicating that it is probably difficult for students to find housing in the area costing less than \$500 per month. In addition, the modal rent of students living off-campus is \$600 per month. This might reflect higher prices off-campus than on-campus. Since on-campus spaces are both limited and in high demand, as reflected by the annual lottery of spaces in the Catalina apartments, it might be difficult for students to find housing off-campus for \$500 per month.

We would recommend that the minimum salary offered to a graduate student be no less than \$20,000 a year, so that if they are able to find an apartment for \$500 a month it will encompass no more than 30% of their pre-tax earnings (as recommended by financial planners). As rental rates increase, we believe that stipends should also increase to allow students to find housing. For students in special circumstances this might not be possible; however, raising the minimum stipend to this level may increase student retention and recruitment, as those students making under \$17,700 a year show higher levels of dissatisfaction with the Caltech graduate experience.

Indicators suggest that rent prices will continue to rise dramatically in the next year. A Casden Forecast released in February 2003 estimates that average rents in Los Angeles county will increase by about 12% through mid-2004. Housing prices in southern California have been climbing by 8.3% per month, and the median price of a home in Los Angeles county is up 24% from a year ago, according to the *Los Angeles Times*.<sup>3</sup> Students typically do not have the resources to invest in real estate, so they do not benefit from the rapidly increasing costs of housing in the area. A cost-of-living increase, applied across all divisions, would help compensate for rising real estate costs. Ideally this increase should account for costs that grow at super-inflationary levels.

The National Science Foundation has increased its twelve-month stipends to \$27,500 for the 2003-2004 fellowship year.<sup>4</sup> If Caltech does not also increase student stipends, the

gap between fellowship holders and non-fellowship students will widen. A large gap between NSF holders and other students would make it difficult for faculty members to support NSF fellows at their fellowship levels when they finish their fellowship years. Such an earnings gap might also cause divisions within the graduate student population. We recommend further study of this issue, so that Caltech can maintain reasonable stipend equity and ensure graduate student satisfaction with the Institute.

While graduate students cannot expect to live expansively on a stipend, most graduate students, particularly at elite institutions such as Caltech, expect to live within their stipends. The ability to meet financial obligations allows students to concentrate on their goals without excessive financial stress. Graduate student stipends are the most direct method by which a university can demonstrate its support for its graduate students. Caltech should therefore take particular care to monitor student stipends and ensure that its stipend levels are consistent with the quality of graduate students it wishes to attract.

## References

1. [http://cgi.money.cnn.com/tools/budget101/budget\\_101.jsp](http://cgi.money.cnn.com/tools/budget101/budget_101.jsp). Accessed on November 22, 2003.
2. <http://www.hud.gov/renting/phprog.cfm>. Accessed on November 22, 2003. Rent is the highest of the following: 30% of monthly adjusted income, 10% of monthly income, welfare rent, or \$25 minimum rent or a higher amount (up to \$50) set by an housing agency.
3. Eryn Brown, "Will L.A.'s Real Estate Bubble Burst?" *Los Angeles Times*, November 2, 2003.
4. <http://www.ehr.nsf.gov/dge/programs/grf>. Accessed on November 15, 2003.

## Appendix. Additional breakdowns

These breakdowns were not significant by chi-squared tests, but might be of interest to the Caltech community, so we include them here.

Figure A1 shows gross stipend by gender. The difference in stipends by gender is significant at the  $p = 0.47$  level.

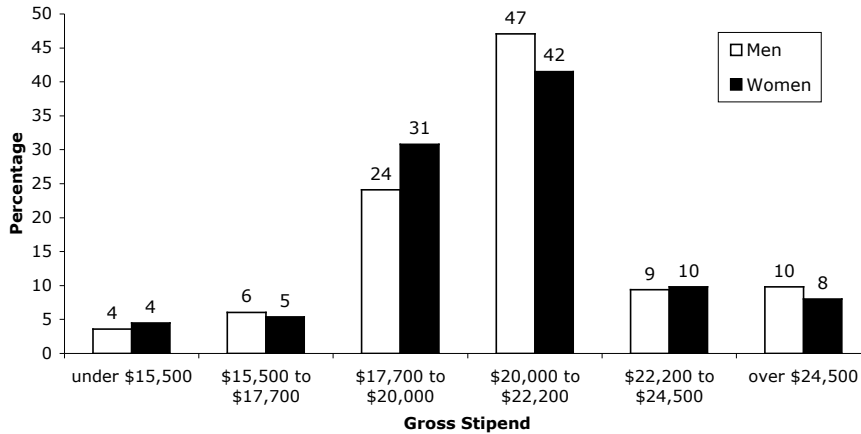


Figure A1. Gross stipend by gender.

Figure A2 shows students' gross stipends, broken down by ethnicity. Only American students are included in this breakdown. The differences in stipends by ethnicity are significant at the  $p = 0.10$  level.

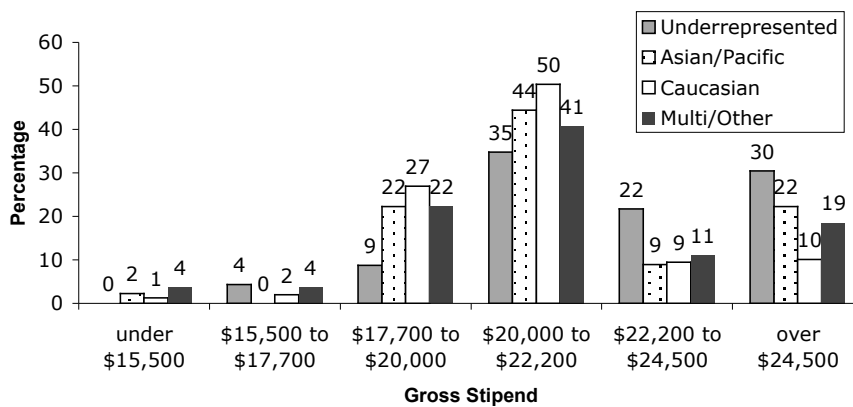


Figure A2. Gross stipend by ethnic background. “Underrepresented” refers to Native Americans, African Americans, and Latin Americans. “Multi/Other” refers to multiracial respondents and those who marked “other”.