Employment Update of the REMI Model

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Introduction

- The 2016 AQMP baseline emission inventories use SCAG's 2016 growth forecast of employment, population and other socioeconomic variables (Health and Safety Code Section 40460).
- For consistency, our analytical framework for evaluating economic impacts, the REMI model, is updated with their employment forecast.
- Based on studies conducted in the 1990s it was recommended that the REMI model should follow similar rates of growth as SCAG for employment.

Data

- Employment forecast from SCAG differs in both its data sources and its general outlook from REMI.
  - SCAG's employment forecast is based on data published in the CA Employment Development Department (EDD) Benchmark along with a set of national forecasts.
  - The REMI model uses employment and compensation data from BEA for its baseline forecast of employment along with the BLS Employment Outlook for the national forecast.
  - There are significant differences in the accounting of self-employed jobs between BEA and ACS PUMS as used by SCAG. As an example for LA county, employment differs by about 1.3 million jobs.

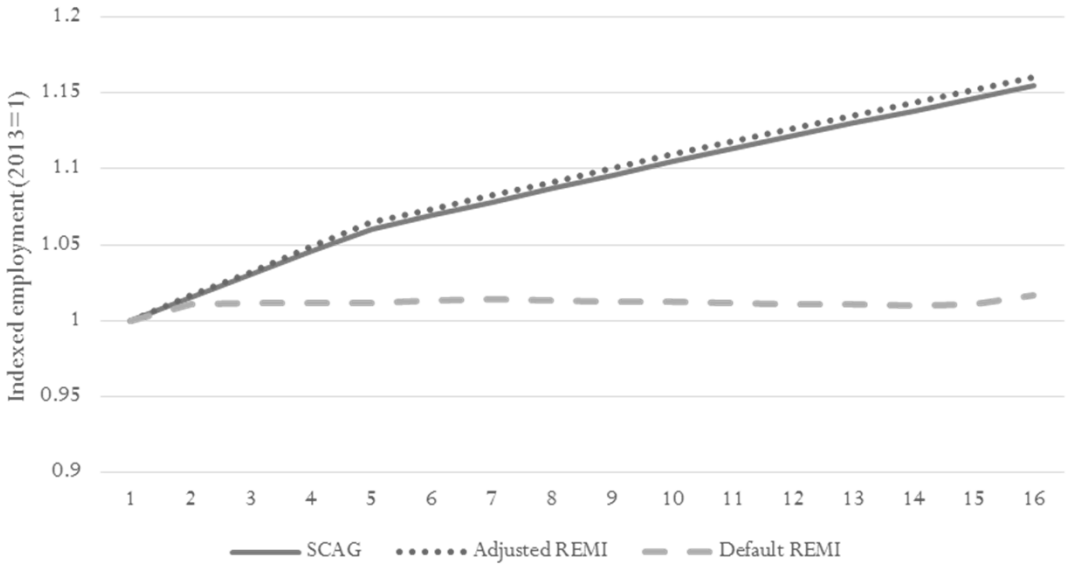
Method

- SCAG provided a forecast of levels of employment by sector from the 2016-2040 RTP/SCS for each of the 21 sub-county regions used within the REMI model for 11 years between 2016 and 2031 SCAG.
  - A Public Administration sector (NAICS 92) includes local, state, and federal government workers. Public school workers and postal workers are also included here.
  - SCAG converts their forecast to the 21 sub-county regions by aggregation of Transportation Analysis Zones (TAZs).
- The yearly growth is calculated for 2013-2031 (2013 is last year of historical data in the REMI model).

Method

- These SCAG employment growth rates are then multiplied by the corresponding REMI default employment level in 2013.
- This results in an employment forecast which begins with REMI's base employment level in 2013, but which grows at the rate forecasted by SCAG.
- This adjusted employment forecast is entered into the REMI model using the Employment Update function.

Results



	2016-2031		
County	unadjusted REMI	adjusted REMI	SCAG
Los Angeles	1%	11%	11%
Orange	3%	12%	12%
Riverside	6%	42%	41%
San Bernardino	2%	30%	29%
4-county region	2%	16%	15%

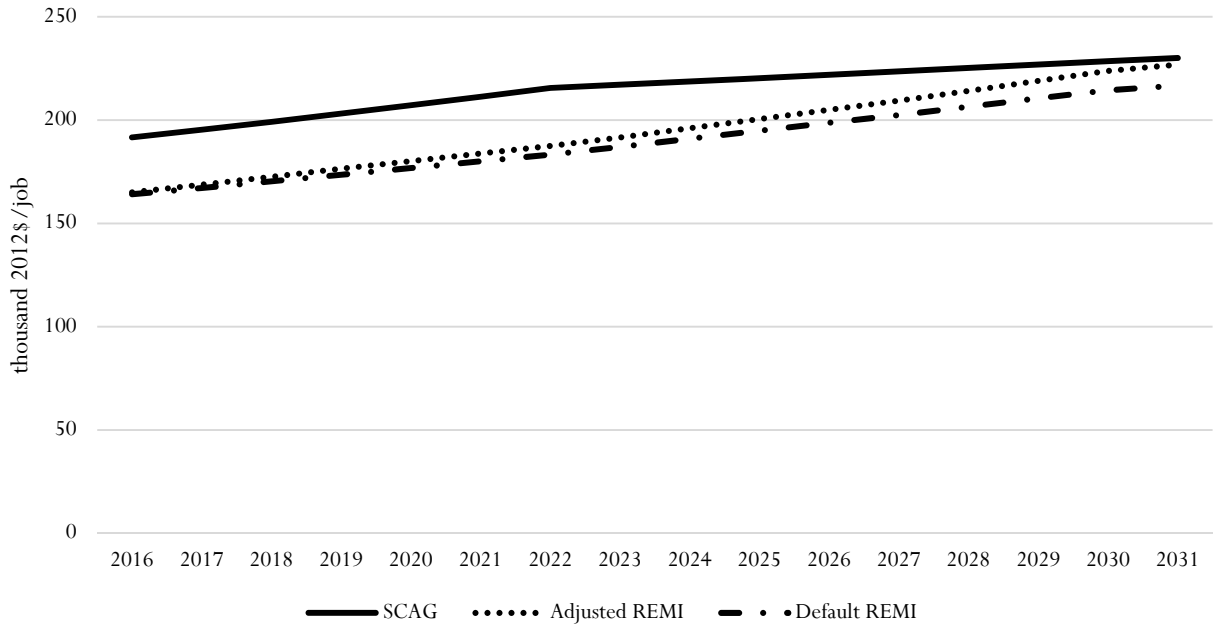
Implications

- Changing the employment forecast in REMI not only changes the levels of employment, it may also change the labor productivity (measured in $/job) which is a major parameter that affects a policy's job impact in REMI.
- The labor productivity is determined according to the simplified production function:

$$Y = LP * E,$$

where Y is output in dollars, LP is the labor productivity, and E is the employment level.

Labor Productivity



Implications

- According to REMI technical staff, the Employment Update function changes *E* from its original values to *E'*, and an algorithm changes *Y*.
  - The percent change in *Y* is less than the percent change in *E* for some industries and more for others.
  - On average, the percentage change in Y with respect percent change in E is 1.
- Changes in the labor productivity with respect to either the unadjusted REMI or SCAG affects the magnitude of employment impacts.

Implications

- To understand this we can solve the production function for employment, *E*:

$$E = EPV * Y$$

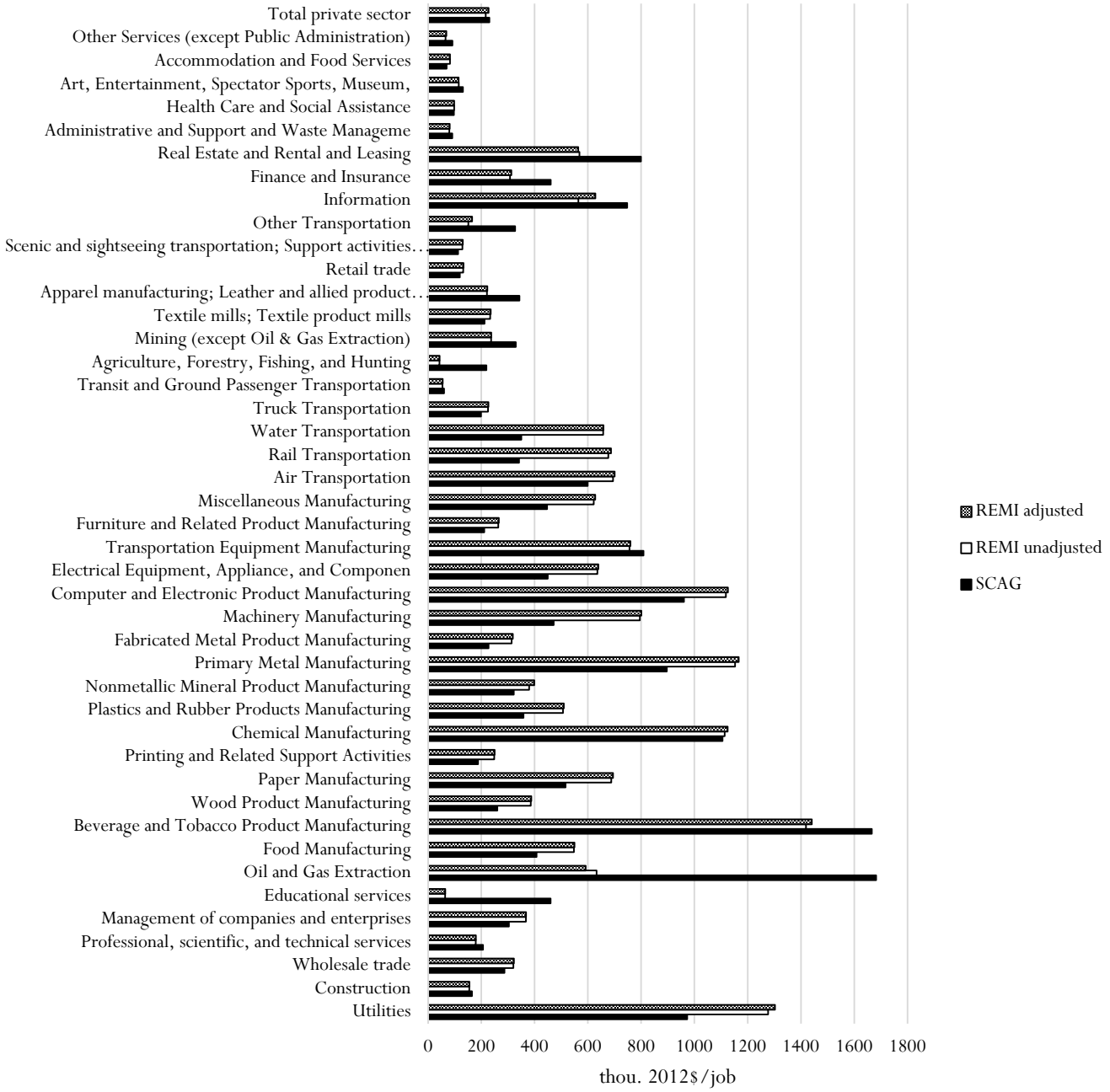
where EPV=LP^{-1} is employees/$.

Totally differentiating:

$$dE = EPV * dY$$

- Then, for some change in output, dY≠0, and some EPV'>EPV, then $|dE'| > |dE|$.
- A policy that directly or indirectly changes output will have an amplified employment impact with a greater *EPV* (lower *LP*) and dampened one with a lower EPV (greater LP).

Labor Productivity in 2031 by Industry



Implications

- Therefore, employment impacts will be greater (less) than those that would be predicted by SCAG or unadjusted REMI when the adjusted REMI model has a lower (greater) labor productivity.
- As an example, using the different estimates of labor productivity for the apparel manufacturing and leather products sector in 2031:
  - A hypothetical policy that caused a $10 million decrease in output
  - Would result in a predicted 30 jobs foregone using SCAG's labor productivity and 47 jobs foregone using the adjusted or unadjusted REMI labor productivities.

Conclusions

- We follow the method of the previous AQMP for the Employment Update with a few refinements.
- REMI's adjusted growth rates are close to SCAG's.
- The employment update causes small changes in labor productivity by sector from the REMI default baseline.
- We adopt REMI's labor productivity which differs from SCAG's that are generally higher.
- Different labor productivities result in different predictions of employment effects when doing policy analysis.