Personal Financial Forecasting Model

Getting Started

Nick V. Zorn
github.com/nickvzorn/financial-forecast

07 August 2017

Introduction to PFFM Workbook

- The Personal Financial Forecasting Model (PFFM) is a spreadsheet/workbook I created to project my family's current financial situation and behaviors forward through retirement and until death
  - Motivation: wanted a tool that could estimate the impact of changing or losing a job by calculating the effect this type of event will have on one's potential net worth and income later in life
- User is presented with one sheet of intuitive input parameters to characterize their salary/-ies along with almost every imaginable type of other savings/investment account and debt:
  - Mortgage, savings, 401(k), Roth & Traditional IRAs, social security, pensions, investments, expenses, credit card debt, childcare, college savings (e.g. 529) accounts and eventual college costs, etc.
  - User enters their own assumptions about how these things will grow/change
  - Flexibility to compare conservative vs. aggressive scenarios

What You Need to Get Started

- A couple of hours
- LibreOffice Calc or Microsoft Excel software
  - Download the example workbook directly from my GitHub repository using one of these links:
    - LibreOffice Calc Version
    - Microsoft Excel 2013 version
    - Microsoft Excel 2003 version
- Current copies of (or numbers from) the following:
  - Monthly pay stub(s)
  - Mortgage loan statement(s)
  - Credit card statement(s)
  - Retirement account statement(s) – 401(k), Traditional IRA, and/or Roth IRA
  - Any other investment (e.g. mutual fund) account statement(s)
  - Any other loan (e.g. auto or student loan) statement(s)
  - Social Security statement(s) (NOTE you can create an online account at this link)
  - Pension statement(s), if applicable
  - Estimates of total monthly expenses – either lazily summed into one number or broken down into categories
  - Children's average monthly daycare/aftercare/camp costs, if applicable
  - Children's college savings (e.g. 529) account statement(s), if applicable

General Guidelines

- General information and model assumptions are summarized on the **README** sheet
- The only sheet that can be modified is the **Input** sheet
  - Green fields can be modified
  - Yellow fields are fixed or auto-calculated values
  - Enter any assets/investments as positive numbers
  - Enter any debts/payments as negative numbers
- The main outputs are plots on the **Net_Income**, **Accumulated_Debt**, **Net_Worth**, and **College** sheets, as well as the monthly *sum of everything* in the **RollUp** sheet

When analyzing the plots, refer back to **RollUp** sheet to understand what's happening at any particular time

How Retirement Income is Modeled

- During retirement and until death, all retirement, investment and savings accounts are modeled to burn down to:
  - Zero for the investment accounts and IRAs, and/or
  - The amount you want to remain in the 401(k) accounts at death
- Payouts from Roth IRAs, savings and investment accounts begin immediately at retirement (even if retirement is before 59.5 years old), but payouts from 401(k) and traditional IRAs begin no earlier than 59.5
  - If retirement is assumed to be after 59.5, all payouts will begin at the retirement age (Input row 30)
- All retirement distributions are modeled as simple annuity payments
- During retirement, monthly expenses are simply assumed to be equal to your retirement distributions minus taxes and health insurance
  - The “available income” fields and “expenses” fields cancel each other out throughout retirement
  - This is a measure of the lifestyle you can afford to maintain in retirement (in future dollars)

Input Sheet: Global Parameters

Globals	
Current date (model start)	2017-06-01
Federal income tax rate (on adjusted) [%]	10.0
State income tax rate (on adjusted) [%]	4.9
Social Security tax rate (on gross) [%]	6.2
Medicare tax rate (on gross) [%]	1.45
Max 401k employee contribution [$/year]	$18,000
Assumed annual increase in health care costs [%]	6.0
CURRENT CREDIT CARD BALANCE [$]	-$30,000
Credit card annual interest rate [%]	16.0
Credit card monthly payment [% of balance]	2.0
CURRENT SAVINGS ACCOUNT BALANCE [$]	$1,000
Savings account annual interest rate [%]	0.1
Minimum age for 401(k) & trad. IRA distributions	59.5

Monthly forecasts corresponding to this section are found in the **Salary_0#**, and **Accumulated_Debt** sheets

- Using your latest pay stub, compute the federal/state income tax rate by dividing the amount of federal/state tax withheld by the gross pay minus retirement (e.g. 401k) and health insurance
- A conservative number for "Assumed annual increase in health care costs" would be 5-6%
- Enter any credit card balance you're carrying forward; enter zero if you pay it off every month. If a carried balance exists, enter the percentage you pay each month as well as the interest rate
- Enter any plain-old savings account balance you currently have. This savings account is assumed to receive any discretionary income you may have left each month.

Input Sheet: Individual Details (part 1)

Individual #1 Details	
Name	Tina
Birthday	1977-05-20
Assumed life expectancy [years]	85.0
Modeled death date	2062-05-20
Start Gross Salary [$/month]	$7,000
Start Gross Salary [$/year]	$84,000
Assumed Annual Raise Rate [%]	2.0
Health insurance (pre-tax) [$/month]	-$300
Assumed age at retirement	65.0
Modeled retirement date	2042-05-20
Gross Salary at Retirement [$/month]	$11,259
Gross Salary at Retirement [$/year]	$135,109
401(k) balance (current) [$]	$50,000
Annual 401(k) employee contribution [%]	5.0
Annual 401(k) employer contribution [%]	5.0
Assumed 401(k) annual rate of return [%]	5.0
Target remaining balance in 401(k) at death [$]	$10,000
Traditional IRA balance (current) [$]	$0
Assumed Traditional IRA annual rate of return [%]	5.0
Monthly contribution to Traditional IRA [$]	$50
Roth IRA balance (current) [$]	$0
Assumed Roth IRA annual rate of return [%]	5.0
Monthly contribution to Roth IRA [$]	$0
Start date of 401(k) and Traditional IRA payout	2042-05-20

- Workbook accepts personal details for up to two people:
  - Birthday
  - Retirement age
  - Assumed life expectancy. See:
    https://www.cdc.gov/nchs/fastats/life-expectancy.htm
    https://www.ssa.gov/OACT/population/longevity.html
  - Current salary and assumed annual raise rate
    - Note: a conservative value would be 2% to align with inflation
  - Current 401(k) balance and contribution amounts, if applicable
    - Also, any 401(k) balance you hope to have left at death
  - Current Traditional IRA and/or Roth IRA balances and monthly contributions, if applicable
  - Assumed annual rates of return on each of these retirement accounts

Monthly forecasts corresponding to this section are found in the **Salary_0#**, **401k_0#**, **IRA_0#**, and **Roth_0#** sheets

Input Sheet: Individual Details (part 2)

Other investment acct. balance (current) [$]	$0
Assumed investment acct. annual rate of return [%]	5.0
Monthly contribution to invest. acct. [$]	$0
Assumed Social Security Payout Age	67.0
Modeled Social Security Payout Start Date	2044-05-20
Social Security Payout [$/month]	$1,500
Assumed Pension Payout Age	65.0
Modeled Pension Payout Start Date	2042-05-20
Pension Payout [$/month]	$500
Student (or other) loan balance (current) [$]	$0
Loan annual interest rate [%]	3.00
Remaining mortgage term [yrs.]	10.0
Payments per year	12
Supplemental monthly loan payment [$]	$0
TOTAL MONTHLY PAYMENT [$]	$0

Monthly forecasts corresponding to this section are found in the **Loan_0#**, **Invest_0#**, **SocialSec_0#**, **Pension_0#** and **Retirement_Dist_0#** sheets

- Workbook accepts personal details for up to two people:
  - Other investment account balance (e.g. mutual fund), the monthly contribution amount and assumed annual rate of return
  - Social Security payout age and monthly amount.
    - Note you can begin receiving SS payments at 65, 67 or 70
    - Refer back to slide 3 for link to create online account with SSA.gov
  - Pension payout age and amount, if applicable
  - Student (or other, e.g. auto) loan details, if applicable: remaining term and balance, interest rate, and any extra payment you'll make each month

Input Sheet: Real Estate Mortgage & Taxes

House Value, Mortgage & R. E. Taxes	
Current estimate of house value [$]	$130,000
Assumed annual increase in house value [$]	1.0
Remaining loan amount [$]	-$110,000
Current equity (principal) [$]	$20,000
Mortgage interest rate [%]	2.75
Remaining mortgage term [yrs.]	10.5
Annual property taxes & insurance [$]	-$3,000
Assumed annual increase in property taxes [%]	3.0
Supplemental monthly principal payment [$]	-$100
Payments per year	12
Monthly principal & interest [$]	-$1,006
Monthly taxes & insurance (current) [$]	-$250
TOTAL MONTHLY PAYMENT [$]	-$1,356

- If you have a mortgage, enter the details in this section:
  - Estimate of market value and estimated annual increase in value
  - Remaining loan amount & term
  - Interest rate
  - Current annual property taxes & insurance and estimate of annual increase in those taxes
  - Any monthly supplemental principal payment you make or wish to make
- Monthly payment is automatically computed

Amortization table and monthly forecast for this section is found in the **Mortgage** sheet

Input Sheet: Monthly Expenses

Monthly Expenses	
Lazy total of a bunch of stuff [$]	-$3,500
Utility bills	$0
Cell phone bill(s)	$0
Cable/internet bill	$0
Groceries	$0
Gasoline	$0
Restaurants	$0
Hardware/Lumber/Garden	$0
Food at Work	$0
Audio/Video/Apps/Magazines	$0
Automotive parts/repair	$0
Rent	$0
Charitable donations	$0
Travel/Parking	$0
Exercise/sports/gym	$0
Hobbies	$0
Alcohol	$0
Gifts for others (e.g. flowers)	$0
Adults' clothing & shoes	$0
Kids' clothing & shoes	$0
Dry Cleaners	$0
Medical/pharmacy	$0
Kids' activities (sports/lessons)	$0
Other/miscellaneous	-$250
TOTAL EXPENSES	-$3,750
Assumed annual increase in expenses [%]	4.0

- This section is for estimates of average monthly expenses in various general categories
- Alternatively, you can just put a total of all monthly expenses in the "lazy total" entry
  - For example, if you pay your credit card balance in full each month, you can use the average of those credit card balances
- Also, estimate the annual increase in all expenses
  - A strict estimate would be ~2% to account for inflation
  - A more conservative estimate might be ~4-5%

Monthly forecast for this section is found in the **Expenses** sheet

Input Sheet: Childcare Costs

Childcare	
Child #01 birthday	2011-07-15
Child #02 birthday	2013-04-25
Child #03 birthday	1899-12-30
Child #01 daycare (pre-K) costs [$/month]	$0
Child #01 daycare end date (enter Kindergarten)	2016-09-01
Child #01 monthly aftercare/camps (K to age 12)	-$750
Child #01 aftercare end date (age 12)	2023-07-15
Child #02 monthly daycare (pre-K)	-$1,500
Child #02 daycare end date (enter Kindergarten)	2018-09-01
Child #02 monthly aftercare/camps (K to age 12)	-$750
Child #02 aftercare end date (age 12)	2025-04-25
Child #03 monthly daycare (pre-K)	$0
Child #03 daycare end date (enter Kindergarten)	1905-09-01
Child #03 monthly aftercare/camps (K to age 12)	$0
Child #03 aftercare end date (age 12)	1911-12-30

- Enter up to three children's birthdays
  - Starting dates for kindergarten are auto-calculated
  - Enter zero for birthday of non-existent children
- For each child, enter average monthly childcare costs for:
  - Preschool (before Kindergarten)
  - After-care and/or camps (typically from Kindergarten until age 12)
  - Enter zero for costs of non-existent children

If not applicable, enter "0" for all birthdays and costs

Input Sheet: College Savings & Costs

Kids' College	
Child #01 college start date	2029-09-01
Child #01 total college cost (estimated) [$]	-$200,000
Child #01 college end date	2033-06-01
Child #01 months of college	45
Child #01 college savings (current) [$]	$25,000
Child #01 assumed annual college savings rate of return [%]	4.0
Child #01 monthly contribution to college savings [$]	$250
Child #02 college start date	2031-09-01
Child #02 total college cost (estimated) [$]	-$200,000
Child #02 college end date	2035-06-01
Child #02 months of college	45
Child #02 college savings (current) [$]	$22,000
Child #02 assumed annual college savings rate of return [%]	4.0
Child #02 monthly contribution to college savings [$]	$250
Child #03 college start date	1918-09-01
Child #03 total college cost (estimated) [$]	$0
Child #03 college end date	1922-06-01
Child #03 months of college	45
Child #03 college savings (current) [$]	$0
Child #03 assumed annual college savings rate of return [%]	4.0
Child #03 monthly contribution to college savings [$]	$0

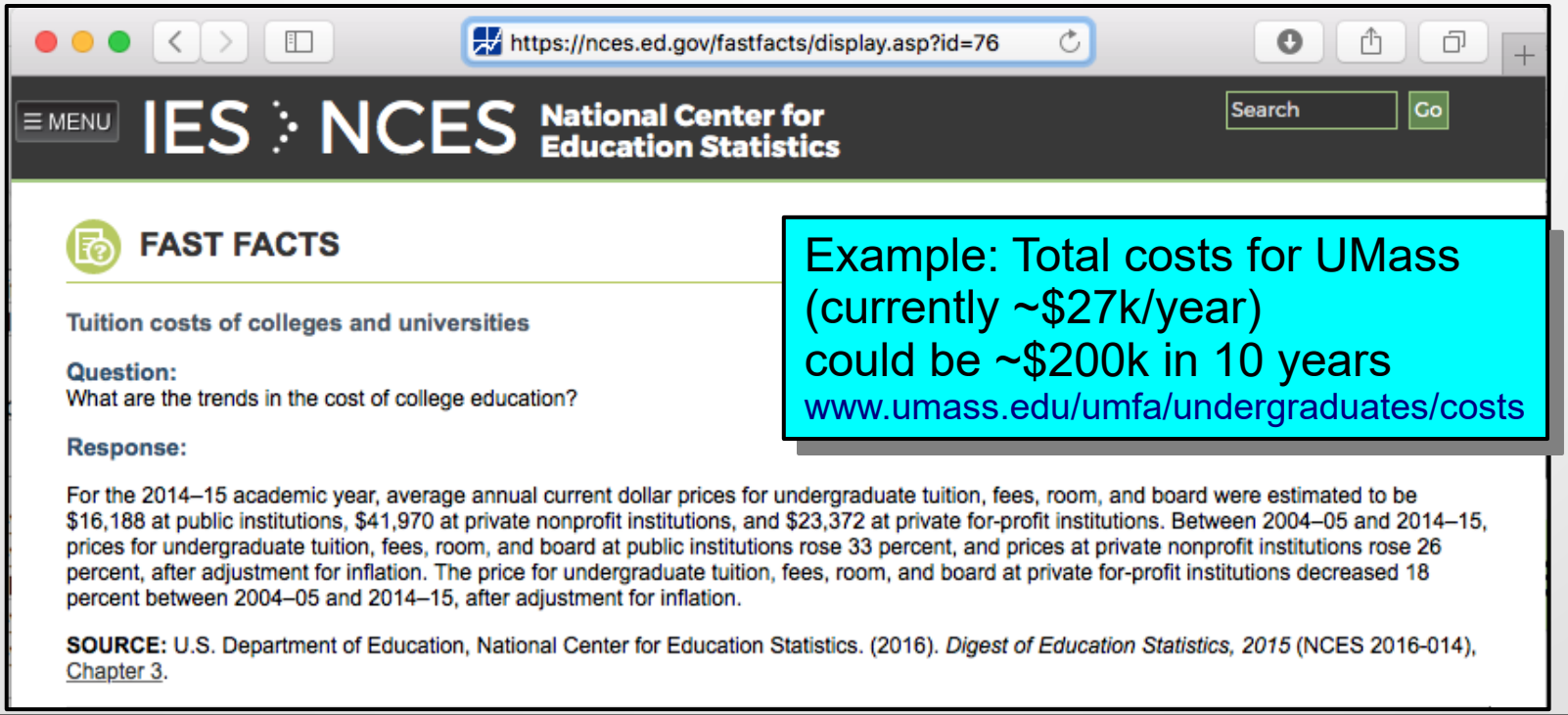
- (IF APPLICABLE)
- Starting dates for four-year college are auto-calculated from birthdays
- For each child, enter estimated total costs for four-year college
  - See the next slide for a guideline
- Also enter any college savings (e.g. in 529 plans) you currently have for each child, as well as the monthly contribution and assumed rate of return

Monthly forecast for this section is found in the **College** sheet

If not applicable, enter “0” for all costs

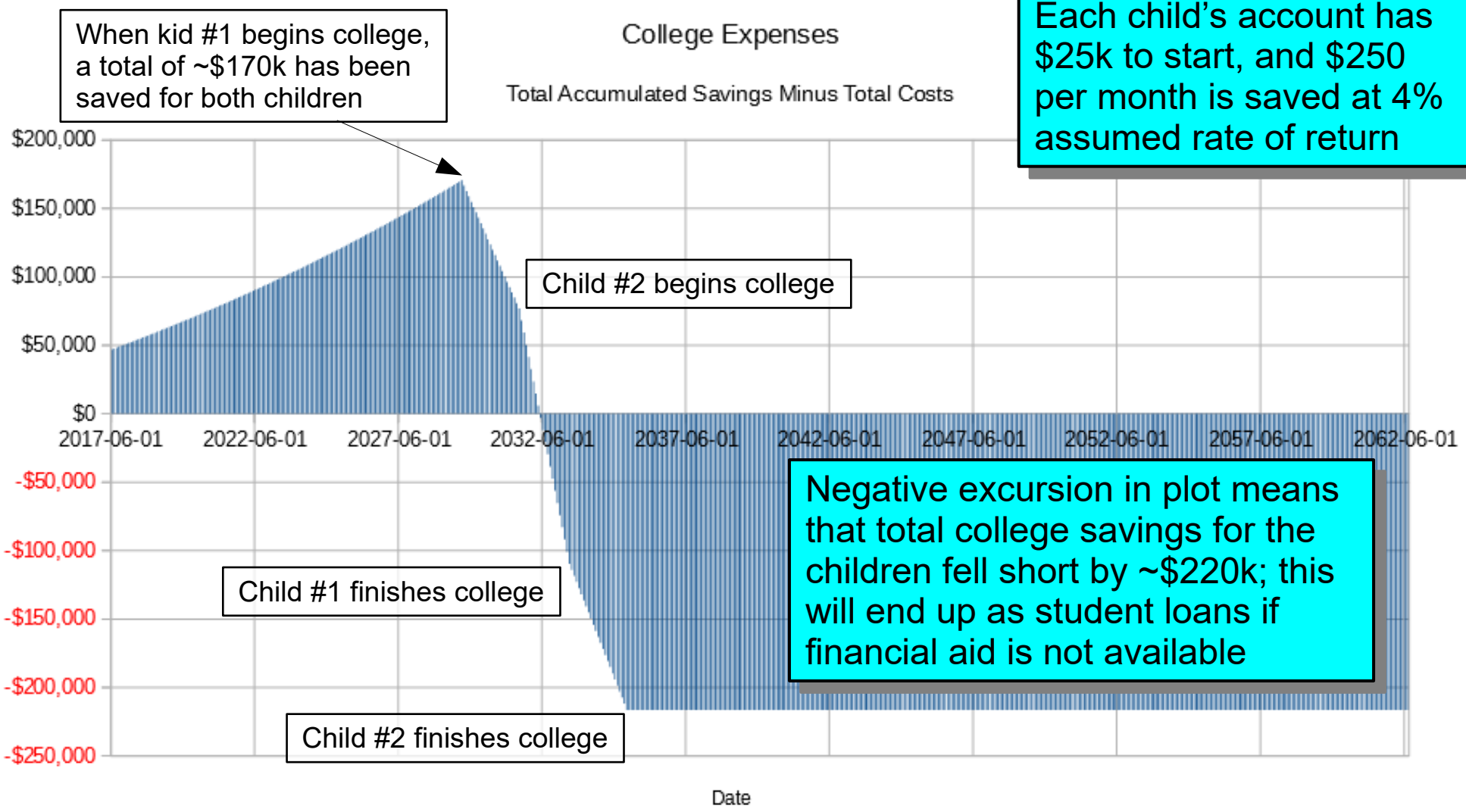
A Note About College Savings

- "Between 2004–05 and 2014–15, prices for undergraduate tuition, fees, room, and board at public institutions rose 33 percent, and prices at private nonprofit institutions rose 26 percent, after adjustment for inflation."
  - In 2014-2015 dollars (as in, including inflation), this corresponded to an annual increase of 5.6% for public and 3.9% for private institutions
  - Taken from: nces.ed.gov/fastfacts



Example: Total costs for UMass
(currently ~$27k/year)
could be ~$200k in 10 years
www.umass.edu/umfa/undergraduates/costs

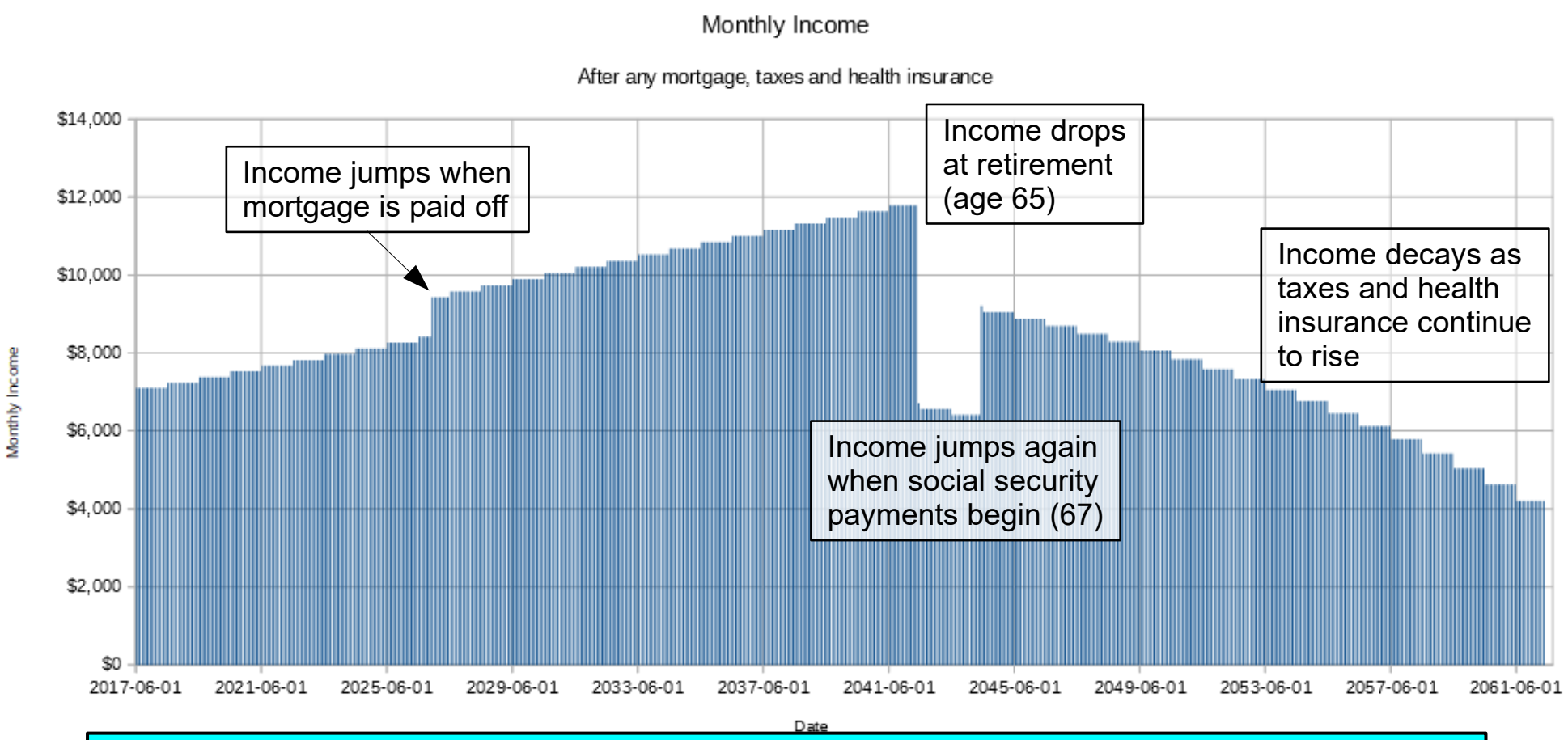
College Savings & Expenses Plot



Example in workbook: Each child's account has $25k to start, and $250 per month is saved at 4% assumed rate of return

Negative excursion in plot means that total college savings for the children fell short by ~$220k; this will end up as student loans if financial aid is not available

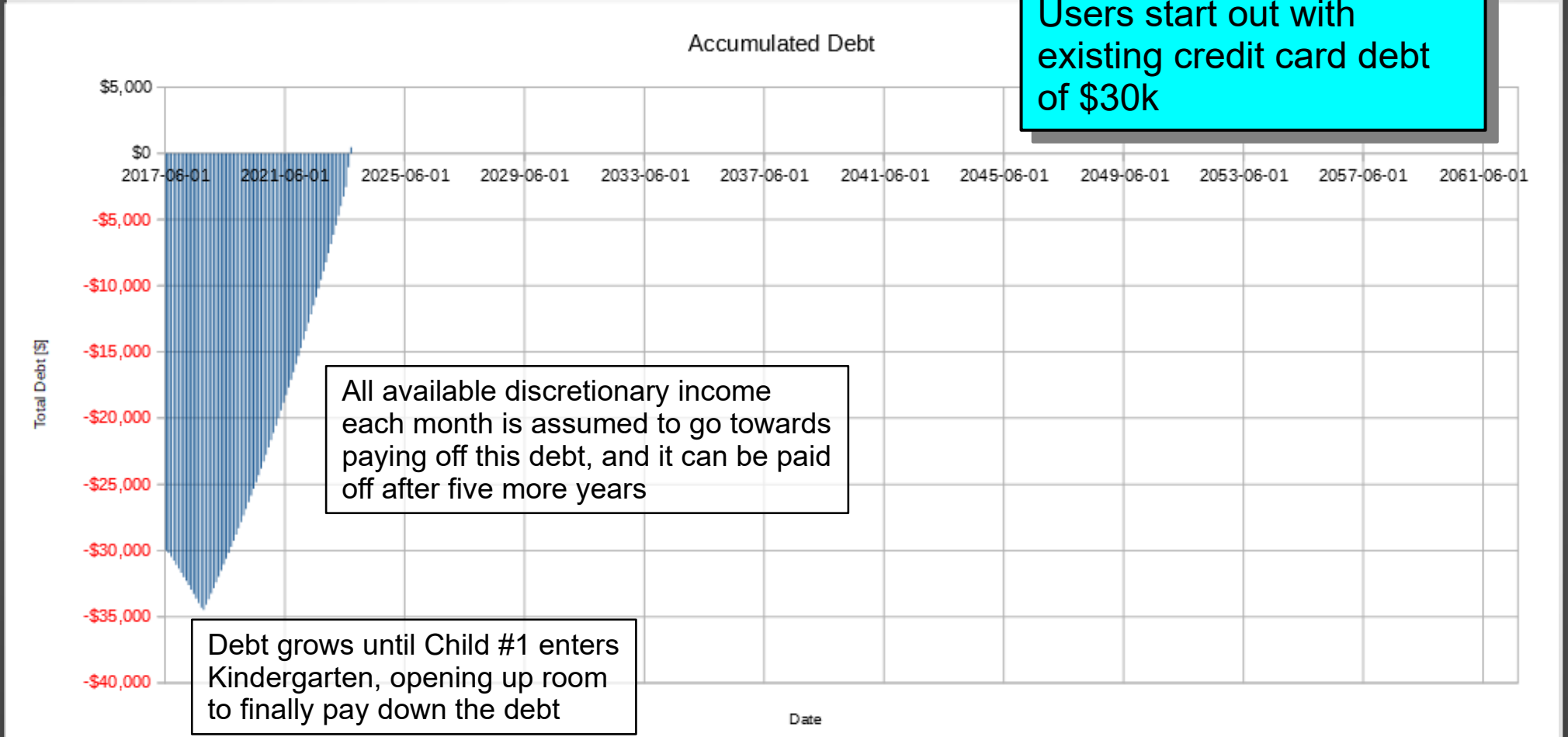
Monthly Income Plot



Example from workbook template:
Note this plot is a form of "net" income, after all taxes (federal, state and real estate), mortgage and health insurance are paid

Accumulated Debt Plot

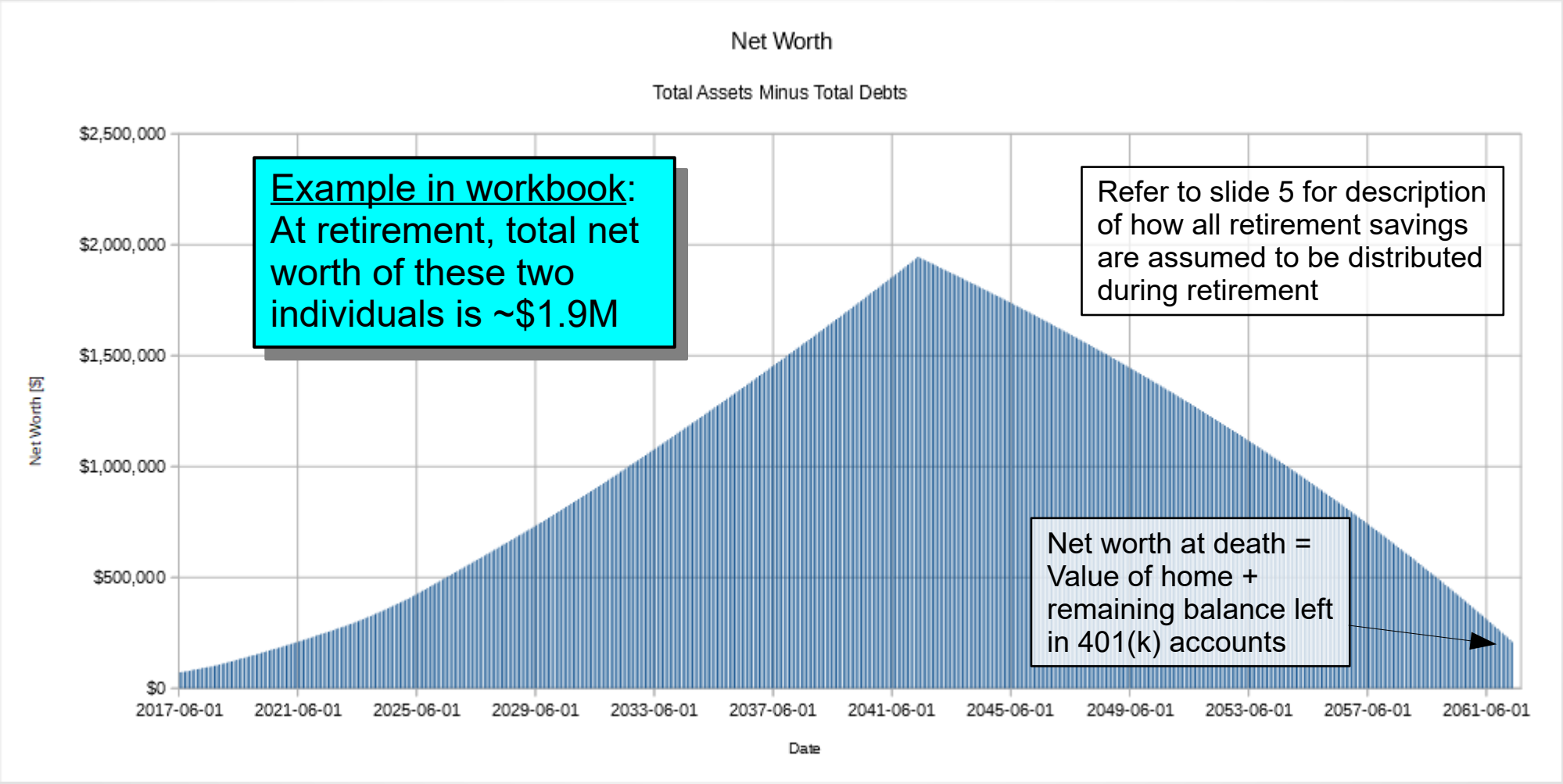
Example in workbook: Users start out with existing credit card debt of $30k



All available discretionary income each month is assumed to go towards paying off this debt, and it can be paid off after five more years

Debt grows until Child #1 enters Kindergarten, opening up room to finally pay down the debt

Net Worth Plot



Summary

- Financial forecasting through retirement is very complex
- This workbook makes some very basic assumptions, yet offers the user a lot of power to model aggressive or conservative forecasts of their financial situation, as well as to compare different hypothetical scenarios
  - e.g. career changes, early retirement, more children, different lifespans, etc.
- Criticism and/or bug reports are welcome!
  - This is a work in progress
  - Feel free to email me at *nickvzorn at gmail dot com*