Budgeting Basics and Calculation Methods

I. Definitions of Variables

- **T** = the total project costs
- **Tr** = the total costs requested from the agency
- **Ts** = the total costs shared by the institution (i.e. cost share/match)
- **C** = the cost sharing rate that the agency requires (expressed as a decimal).
    - **1-C** = the proportion of the total project, expressed as a decimal, that is being requested from the agency when match requirements are based on total project costs (T)
- **D** = total direct costs for the project
- **Da** = F&A-baring direct costs
- **Dn** = F&A-exempt direct costs
- **I** = indirect costs
- **R** = the appropriate indirect cost rate of the institution, expressed as a decimal
- **Y** = the sponsor-limited F&A rate on Total Project Costs (T)
- **X** = the effective F&A rate on Total Direct Costs (D)

II. Calculations Involving Cost Sharing

General Relationships:

- **T = Tr + Ts**
- **T = Tr / (1-C)**
- **Ts = T x C**
- **Ts = (Tr / (1-C) - Tr**

Case 1: Finding the Total Cost Share (Ts)

This case applies when **the cost sharing required rate (C) and the amount to be requested from the agency (Tr) are known**.

- **Solution Formula: Ts = (Tr / (1-C) - Tr**

- **Example:** An agency requires 20% cost sharing (C=0.20). You need to request \$175,000 (Tr).
    - **Calculation:** Ts = (\$175,000 / 0.80) = \$218,750 - \$175,000 = **\$43,750**.
    - The institution must cost-share \$43,750, making the total project cost \$218,750.

Case 2: Finding the Amount to Request (Tr)

This case applies when **the cost sharing rate (C) is known, but the institution only has a set amount available to cost share (Ts)**.

- **Solution Formula: Tr = (Ts x (1 - C)) / C**.
- **Example:** A program requires 5% cost-sharing (C=0.05). You can only cost share \$5,250 (Ts).
    - **Calculation:** Tr = (\$5,250 x (1 - 0.05)) / 0.05 = (\$5,250 x 0.95) / 0.05 = \$4,987.50 ÷ 0.05 = **\$99,750**.
    - You can request up to \$99,750 from the agency, making the total project cost \$105,000.

III. Calculations Involving Facilities and Administrative (Indirect) Costs (F&A/IDC)

General Relationships:

- **I = Da x R**.
- **Tr = D + I**.
- **Tr** can be restated as **Tr = Dn + (Da x R)**.

Case 1: Finding Total Direct Costs (D)

This case applies when **the total amount to be requested from the agency (Tr) is known, assuming all direct costs are subject to F&A/IDC**.

- **Solution Formula: D = Tr / (1 + R)**.
- **Example:** The maximum grant (Tr) is \$150,000. The indirect cost rate (R) is 48% (0.48).
    - **Calculation:** D = \$150,000 / (1 + 0.48) = \$150,000 ÷ 1.48 = **\$101,351**.

    - Thus, \$101,351 can be requested for direct costs, with **\$48,649** as indirect costs (since I = Tr - D).

- **Algebraic Relationship for Salaries:** This relationship also applies to salaries. If \$10,000 is available for salary and fringe benefits, and the fringe benefit rate is 25%, the amount available for the salary is \$10,000 divided by 1.25, which equals **\$8,000**.

Case 2: Finding Direct Costs Subject to F&A (Da)

This case applies when **the total amount to be requested (Tr) is known, but items with exempt from indirect costs (Dn) are included** in the budget.

- **Solution Formula:** The amount left for direct costs subject to F&A (**Da**) is calculated as: **Da = (Tr – Dn) / (1 + R)**.

- **Example:** The total amount a researcher can request (Tr) is \$150,000. The indirect rate (R) is 48%. A \$20,000 piece of equipment will be purchased, which is <u>not</u> subject to F&A **(Dn)**.

    - **Calculation:** (\$150,000 - \$20,000) / (1 + 0.48) = \$130,000 / 1.48 = **\$87,838**.

Case 3: Finding F&A Amount on Total Direct Costs

This case applies when **the total amount to be requested (Tr) is known, but the F&A rate is on Total Project Costs or Total Request from Agency,** but you need the rate as a function of **Total Direct Costs**.

- **Solution Formula: Y = X/(1-X)**
- **Example:** The maximum award amount is \$450,000 with an F&A rate limited to 25% of total project costs. What is the effective F&A rate on Total Direct Costs?
    - **Calculation:** 0.25/(1-0.25) = 0.3333 = 33.33%

IV. Additional Numerical Problem Examples

1. A researcher is proposing a budget to NSF for only $50,000 in equipment. The IDC rate is 46%. How much money will be available for equipment?

a. $22,750

b. $50,000

c. $27, 250

d. $24,000

2. XYZ University has an Indirect cost rate of 45.5%. A project is budgeted at $125,000.00 in direct costs and includes permanent equipment at $30,000.00 which is the only item excluded from the indirect cost base. What are the total project costs?

a. $195,525

b. $181,875

c. $168,225

d. $246,000

3. An institution has an indirect cost rate of 40%. A research project is budgeted at $125,000 in direct costs including an item of equipment at $25,000 which is the only item excluded from the indirect cost base. What is the total cost for the project?

a. $135,000

b. $150,000

c. $165,000

d. $175,000

4. The University of Chicago is going to be sub-recipient on a budget. The total direct costs of the lead institution's budget are $150,000 and the University of Chicago will be receiving $30,000. What will be the total project costs if the lead institution's F&A rate is 45.5%?

A. $185,975

B. $215,975

C. $188,250

D. $218,250

5. Calculate the Indirect Rate for a university using modified total direct costs of $75,000 and total project costs of $100,000 assuming no F&A exempt costs.

A. 33.33%

B. 25.00%

C. 30.50%

D. 29.55%

6. HRSA has awarded a Ryan White award in the overall amount of $750,000.00 to Dr. Thomas to operate an HIV/AIDS clinic. Assuming an F&A rate of 10% Total Project Costs, how much is available to Dr. Thomas for direct costs?

a. $675,000

b. $750,000

c. $700,000

d. $625,000

7. Dr. Smith was awarded an NIH R01 award to study the use of berries in treating cancer. Dr. Smith's total award was issued for $473,250 inclusive of funds to purchase a microscope for $31,500 and $16,000 for student tuition. Dr. Smith's institution has a negotiated rate of 42% MTDC. What are the total direct costs awarded to Dr. Smith for his project?

a. $417,951

b. $ 324,242

c. $350,000

d. $347,324

8. A sponsor requires 5% cost-sharing of total project costs from the institution on the project. It is determined the institution can only cost-share $5,000. How much can you request from the sponsor?

A. $95,000

B. $105,000

C. $100,000

D. $90,000

9. This DOE solicitation requires cost sharing – 20% of total project costs. Total project costs (federal dollars) are $300,000. What is the Total Cost sharing amount required?

A. $75,000

B. $65,000

C. $60,000

D. $72,500

10. You proposal budget to USDA is applying an F&A rate of 30% of Total Project Costs. What is the effective rate on Total Direct Costs to apply to your budget template?

A. 30%

B. 50.32%

C. 42.85%

D. 28.42%

11. Dr. Pepper has an R01totalling $450,000 which includes $15,000 in equipment and F&A at 52%. She has approval to re-budget equipment to $20,000. If her total award amount remains unchanged, what are the direct and indirect totals after accounting for the change in equipment?

A. $300,000 direct costs; $150,000 indirect costs

B. $302,895 direct costs; $147,105 indirect costs

C. $310,000 direct costs; $140,000 indirect costs

D. $350,000 direct costs; $100,000 indirect costs

ANSWERS

1. **B - $50,000**
    a. No IDC/F&A is charged on equipment
2. **C - $168,225**
    a. $125,000 (direct costs) - $30,000 (Permanent Equipment) = $95,000
    b. Modified Total Direct costs = $95,000
    c. $95,000 (MTDC) * 45.5% (Indirect Rate) = $43,225 (F&A Costs)
    d. $125,000 (direct costs) + $43,325 (F&A Costs) = **$168,225** Total Project costs
3. **C - $165,000**
    a. MTDC = $125,000 - $25,000 = $100,000
    b. IDC = 40% (0.40)
    c. MTDC x IDC rate = IDC amount -- $100,000 x 0.4 = $40,000
    d. Total Project Cost = Direct Costs + F&A Costs -- $125,000 + $40,000 = **$165,000**
4. **B - $215,975**
    a. Calculate F&A on subrecipient separately
    b. Modified MTDC = Total Direct Costs (TDC) – Total Subaward amount
        i. $150,000 - $30,000 = $120,000
    c. F&A on Modified MTDC = Modified MTDC x 0.455
        i. $120,000 x 0.455 = $54,600
    d. F&A on first $25K of subaward
        i. $25,000 x 0.455 = $11,375
    e. Total Project Costs
        i. $150,000 (TDC) + $54,600 (F&A on Modified MTDC) + $11,375 (F&A on subaward $25K) = **$215,975**
5. **A - $33.33%**
    a. **Method #1**
        i. Total Project Costs = MTDC + F&A Costs
        ii. Total Project Costs – MTDC = F&A Costs
            1. $100,000 - $75,000 = $25,000
        iii. MTDC x F&A Rate = F&A Costs
            1. $75,000 x F&A Rate = $25,000
        iv. F&A Rate = F&A Costs / MTDC
            1. $25,000 / $75,000 = 0.3333 = **33.33%**
    b. **Method #2**
        i. Total Project Costs = MTDC x (1 + F&A Rate)
        ii. 1 + F&A Rate = Total Project Costs / MTDC

            1. $100,000 / $75,000 = 1.3333
        iii. F&A Rate = (1+ F&A Rate) -1
            1. 1.3333 – 1 = 0.3333 = **33.33%**

6. **A - $675,000**
    a. F&A Costs = Total Project Costs x F&A Rate
        i. $750,000 x 0.1 = $75,000
    b. Total Direct Costs = Total Project Costs – F&A Costs
        i. $750,000 - $75,000 = **$675,000**
7. **D - $347,324**
    a. Tuition and Capital Equipment are excluded from the MTDC base
    b. Total Direct Costs – Exempt Costs (tuition and equipment) = Total MTDC + F&A Costs
        i. $473,250 - $31,500 - $16,000 = $425,750
    c. Total Direct Costs = ((Total MTDC + F&A Costs) / (1 + F&A Rate)) + Exempt Costs
        i. $425,750 / 1.42 = $299,824
        ii. $299,824 + $31,500 + $16,000 = **$347,324**
8. **A - $95,000**
    a. Recall **Tr = (Ts x (1 - C)) / C**
    b. Tr = ($5,000 x (1 – 0.05)) / 0.05
        i. ($5,000 x 0.95) / 0.05 = $4,750 / 0.05 = **$95,000**
9. **A - $75,000**
    a. Recall **Ts = (Tr / (1-C)) – Tr**
    b. Ts = ($300,000 / (1 – 0.2)) - $300,000
        i. ($300,000 / 0.8) - $300,000 = $375,000 - $300,000 = **$75,000**
    c. Check Work
        i. $300,000 + $75,000 = $375,000
        ii. $375,000 x 0.2 = **$75,000**
10. **C – 42.85%**
    a. Recall **Y = X/(1-X)**
        i. 0.3 / (1-0.3) = 0.3/0.7 = 0.4285 = 42.85%
11. **B - $302,895; 147,105**
    a. $450,000 - <u>$20,000</u> (new equipment amount) = $430,000 (MTDC + IDC)
    b. $430,000 / 1.52 = $282,895 (Total MTDC)
    c. $282,895 + $20,000 = **$302,895 (Total Direct Costs)**
    d. $450,000 - $302,895 = **$147,105 (Total Indirect Costs)**