APPENDIX B:  
Data
B.1) List of Models

- **Unshelled peanuts – Total (100%)**
  ✶ Producer base price
    • Pessimistic adoption profile
      ★ Parallel shift 1
      ★ Pivotal shift 2
    • Optimistic adoption profile
      ★ Parallel shift 3
      ★ Pivotal shift 4

- **Unshelled peanuts – On farm consumption (24%)**
  ✶ Unofficial market price
    • Pessimistic adoption profile
      ★ Parallel shift 5
      ★ Pivotal shift 6
    • Optimistic adoption profile
      ★ Parallel shift 7
      ★ Pivotal shift 8
  ✶ Producer base price
    • Pessimistic adoption profile
      ★ Parallel shift 9
      ★ Pivotal shift 10
    • Optimistic adoption profile
      ★ Parallel shift 11
      ★ Pivotal shift 12

- **Unshelled peanuts – Informal market (10%)**
  ✶ Unofficial market price
    • Pessimistic adoption profile
      ★ Parallel shift 13
      ★ Pivotal shift 14
    • Optimistic adoption profile
      ★ Parallel shift 15
      ★ Pivotal shift 16
- **Peanut seeds – Formal market (15%)**
  ♦ Producer base price
    • Pessimistic adoption profile
      ★ Parallel shift 17
      ★ Pivotal shift 18
    • Optimistic adoption profile
      ★ Parallel shift 19
      ★ Pivotal shift 20

- **Peanut oil – Formal market (17.5%)**
  ♦ World price
    • Pessimistic adoption profile
      ★ Parallel shift 21
      ★ Pivotal shift 22
    • Optimistic adoption profile
      ★ Parallel shift 23
      ★ Pivotal shift 24

- **Peanut cakes – Formal market (17.5%)**
  ♦ World price
    • Pessimistic adoption profile
      ★ Parallel shift 25
      ★ Pivotal shift 26
    • Optimistic adoption profile
      ★ Parallel shift 27
      ★ Pivotal shift 28
B.2) Spreadsheets

1) Unshelled Peanuts (total) – Producer base price

- Supply elasticity: $\varepsilon = 0.77$ (Akobundu, 1998)
- Demand elasticity: $e = 0.18$ (Sullivan et al, 1992)

- Proportionate yield change per hectare: $\Delta Y/Y = 0.30$ (Ndoye, July 19th, 2000)
- Gross proportionate cost reduction per ton of output: $\Delta Y/eY = 0.30/0.77 = 0.39$
- Proportionate additional cost per hectare: $\Delta C/C = 0.20$ (Table 3.16)
- Proportionate additional cost per ton of output: $\Delta C/C(1+\Delta Y/Y) = 0.20/(1+0.30) = 0.15$
- Net proportionate cost reduction per ton of output: $\Delta Y/eY - \Delta C/C(1+\Delta Y/Y) = 0.39 - 0.15 = 0.24$

- Probability of research success: $p = 1$
- Adoption rate: $A_t$ (Table 3.17)

- Supply shift: $K_t = [\Delta Y/eY - \Delta C/C(1+\Delta Y/Y)]pA_tP_b$
- Proportionate decrease in price: $E_t = K_t\varepsilon/e$

- Proportionate change in population: $u = 0.027$ (Senegal, Republic of, Direction de la Prévision et de la Statistique, 1999)
- Proportionate change in per capita income: $i = 0.0063$ (average of years 1976-86, 1987-97 and 1998-02: -0.011-0.004+0.034/3) (IMF, 1998)
- Income elasticity of demand: $e_{ii} + \sum e_{ij} + n_i = 0 \rightarrow \text{assuming } \sum e_{ij} = 0, n_i = -e_{ii} = 0.18$
- Proportionate change in demand: $u + in = 0.028$ (approximation for $L/Q_o$)

- Initial consumer price (before demand shift): $P_o = 144$ FCFA/kg (average of years 1996-1999: 183+137.656+114+142/4) (Senegal, Republic of, Ministère de l’Économie, des Finances et du Plan, 2000 a)
- Final consumer price (after demand shift): $P = P_o(1 + (L/Q_o)/e) = 167$ FCFA/kg
- Producer base price: $P_b = 146.5$ FCFA/kg (average of years 1996-1999: 131+150+160+145/4) (Senegal, Republic of, Ministère de l’Économie, des Finances et du Plan, 2000 a)
- Final quantity (after demand shift): $Q = Q_o = 599,731$ 1000kg

- Change in consumer surplus: $\Delta CS = EQ(1 + \frac{1}{2}Ee/P)$ (parallel and pivotal shift)
- Change in producer surplus: $\Delta PS = KQ(1 + \frac{1}{2}eK/P_b)$ (parallel shift) or $\Delta PS = \frac{1}{2}KQ(1 + \varepsilon K/P_b)$ (pivotal shift)
- Change in cost of subsidy: $\Delta GC = EQ\left(1 + ((P_b - P) + E)e/P\right)$
- Change in net social welfare: $\Delta NSW = \Delta CS + \Delta PS - \Delta GC$
- Cost of salaries: max annual public salary * scientists + minimum annual public salary * assistants for each year between 1985 and 1996 (Table 3.18)
- Research costs: $RC = 1.2 \times \text{cost of salaries}$

- Net total benefits: $\Delta TS - RC$
- Net present value in FCFA: $(NB, 0.0625)$
- Net present value in US$: NPV \text{ in FCFA/exchange rate}$
2) UNSHELLED PEANUTS (ON FARM CONSUMPTION) - UNOFFICIAL PRICE

- Supply elasticity: $\varepsilon = 0.77$ (Akobundu, 1998)
- Demand elasticity: $e = 0$

- Proportionate yield change per hectare: $\Delta Y/Y = 0.30$ (Ndoye, July 19th, 2000)
- Gross proportionate cost reduction per ton of output: $\Delta Y/\varepsilon Y = 0.30/0.77 = 0.39$
- Proportionate additional cost per hectare: $\Delta C/C = 0.21$ (Table 3.16)
- Proportionate additional cost per ton of output: $\Delta C/C(1+\Delta Y/Y) = 0.21/(1+0.30) = 0.16$
- Net proportionate cost reduction per ton of output: $\Delta Y/\varepsilon Y - \Delta C/C(1+\Delta Y/Y) = 0.39 - 0.16 = 0.23$

- Probability of research success: $p = 1$
- Adoption rate: $A_t$ (Table 3.17)

- Supply shift: $K_t = [\Delta Y/\varepsilon Y - \Delta C/C(1+\Delta Y/Y)]pA_tP$
- Proportionate decrease in price: $E_t = K\varepsilon/(\varepsilon + e) = K_t$

- Proportionate change in population: $u = 0.027$ (Senegal, Republic of, Direction de la Prévision et de la Statistique, 1999)
- Proportionate change in per capita income: $i = 0.0063$ (average of years 1976-86, 1987-97 and 1998-02: -0.011-0.004+0.034/3) (IMF, 1998)
- Income elasticity of demand: $e_{ii} + \sum e_{ij} + n_i = 0 \rightarrow$ assuming $\sum e_{ij}=0$, $n_i = - e_{ii} = 0.18$
- Proportionate change in demand: $u + in = 0.028$ (approximation for $L/Q_o$)

- Initial price (before demand shift): $P_o = 135.5$ FCFA/kg (average of years 1995 and 1996: 125.4+128+129.5+130.3+139.7+160.4/6) (Gaye, 1997)
- Final price (after demand shift): $P = P_o(1 + (L/Q_o)/\varepsilon) = 141$ FCFA/kg

- Initial quantity: $Q_o = 0.24*599,731 = 143,935$ 1000kg
- Final quantity: $Q = Q_o(1+L/Q_o) = 147,985$ 1000kg

- Change in consumer surplus: $\Delta CS = EQ$ (parallel shift) or $\Delta CS = \frac{1}{2} EQ$ (pivotal shift)
3) UNSHELLED PEANUTS (ON FARM CONSUMPTION) – PRODUCER BASE PRICE

- Supply elasticity: $\varepsilon = 0.77$ (Akobundu, 1998)
- Demand elasticity: $e = 0$

- Proportionate yield change per hectare: $\Delta Y/Y = 0.30$ (Ndoye, 17th July, 2000)
- Gross proportionate cost reduction per ton of output: $\Delta Y/\varepsilon Y = 0.30/0.77 = 0.39$
- Proportionate additional cost per hectare: $\Delta C/C = 0.20$ (Table 3.16)
- Proportionate additional cost per ton of output: $\Delta C/C(1+\Delta Y/Y) = 0.20/(1+0.30) = 0.15$
- Net proportionate cost reduction per ton of output: $\Delta Y/\varepsilon Y - \Delta C/C(1+\Delta Y/Y) = 0.39 - 0.15 = 0.24$

- Probability of research success: $p = 1$
- Adoption rate: $A_t$ (Table 3.17)
- Supply shift: $K_t = [\Delta Y/\varepsilon Y - \Delta C/C(1+\Delta Y/Y)]pA_tP_b$
- Proportionate decrease in price: $E_t = K\varepsilon/(\varepsilon + e) = K_t$

- Proportionate change in population: $u = 0.027$ (Senegal, Republic of, Direction de la Prévision et de la Statistique, 1999)
- Proportionate change in per capita income: $i = 0.0063$ (average of years 1976-86, 1987-97 and 1998-02: -0.011-0.004+0.034/3) (IMF, 1998)
- Income elasticity of demand: $e_{ii} + \sum e_{ij} + n_i = 0$ → assuming $\sum e_{ij} = 0$, $n_i = - e_{ii} = 0.18$
- Proportionate change in demand: $u + i n = 0.028$ (approximation for $L/Q_0$)

- Producer base price: $P_b = 146.5$ FCFA/kg
- Initial quantity: $Q_o = 0.24*599,731 = 143,935 1000kg$
- Final quantity: $Q = Q_o (1+L/Q_o) = 147,985 1000kg$

- Change in consumer surplus: $\Delta CS = 0$ (parallel and pivotal shift)
4) UNSHELLED PEANUTS – INFORMAL MARKET – UNOFFICIAL PRICE

- Supply elasticity: $\varepsilon = 0.77$ (Akobundu, 1998)
- Demand elasticity: $e = 0.18$ (Sullivan et al, 1992)

- Proportionate yield change per hectare: $\Delta Y/Y = 0.30$ (Ndoye, July 19th, 2000)
- Gross proportionate cost reduction per ton of output: $\Delta Y/\varepsilon Y = 0.30/0.77 = 0.39$
- Proportionate additional cost per hectare: $\Delta C/C = 0.21$ (Table 3.16)
- Proporionate additional cost per ton of output: $\Delta C/C(1+\Delta Y/Y) = 0.21/(1+0.30) = 0.16$
- Net proportionate cost reduction per ton of output: $\Delta Y/\varepsilon Y - \Delta C/C(1+\Delta Y/Y) = 0.39 - 0.16 = 0.23$

- Probability of research success: $p = 1$
- Adoption rate: $A_t$ (Table 3.17)

- Supply shift: $K_t = [\Delta Y/\varepsilon Y - \Delta C/C(1+\Delta Y/Y)]pA_tP$
- Proportionate decrease in price: $E_t = K_t\varepsilon/(\varepsilon + e)$

- Proportionate change in population: $u = 0.027$ (Senegal, Republic of, Direction de la Prévision et de la Statistique, 1999)
- Proportionate change in per capita income: $i = 0.0063$ (average of years 1976-86, 1987-97 and 1998-02: -0.011-0.004+0.034/3) (IMF, 1998)
- Income elasticity of demand: $e_{ii} + \sum e_{ij} n_i = 0 \rightarrow \text{assuming } \sum e_{ij} = 0, n_i = - e_{ii} = 0.18$
- Proportionate change in demand: $u + in = 0.028$ (approximation for $L/Q_o$)

- Initial price (before demand shift): $P_o = 135.5$ FCFA/kg
- Final price (after demand shift): $P = P_o(1 + (L/Q_o)/(\varepsilon + e)) = 141$ FCFA/kg

- Initial quantity: $Q_o = 0.10*599,731 = 59,973$ 1000kg
- Final quantity: $Q = Q_o (1 + L/Q_o - (Le/Q_o)/(\varepsilon + e)) = 61,341$ 1000kg

- Change in consumer surplus: $\Delta CS = EQ(1+\frac{1}{2}Ee/P)$ (parallel and pivotal shift)
- Change in producer surplus: $\Delta PS = (K-E)Q(1+\frac{1}{2}Ee/P)$ (parallel shift) or $\Delta PS = \Delta TS - \Delta CS$ (pivotal shift)
- Change in total surplus: $\Delta TS = KQ (1+ \frac{1}{2} Ee/P)$ (parallel shift) or $\Delta TS = \frac{1}{2}KQ (1+ Ee/P)$ (pivotal shift)

- Cost of salaries: max annual public salary * scientists + minimum annual public salary * number of assistants for each year between 1985 and 1996 (Table 3.18)
- Research costs: $RC = 0.10*1.2 * \text{cost of salaries}$
- Net total benefits: \( NB = \Delta TS - RC \)
- Net present value in FCFA: \( (NB, 0.0625) \)
- Net present value in US$: \( \text{NPV in FCFA/exchange rate} \)
- Supply elasticity: \( e = 0.77 \) (Akobundu, 1998)
- Demand elasticity: \( 
\varepsilon = 0.18 \) (Sullivan et al, 1992)

- Proportionate yield change per hectare: \( \Delta Y/Y = 0.30 \) (Ndoye, July 19\textsuperscript{th}, 2000)
- Gross proportionate cost reduction per ton of output: \( \Delta Y/\varepsilon Y = 0.30/0.77 = 0.39 \)
- Proportionate additional cost per hectare: \( \Delta C/C = 0.20 \) (Table 3.16)
- Proportionate additional cost per ton of output: \( \Delta C/C(1+\Delta Y/Y) = 0.20/(1+0.30) = 0.15 \)
- Net proportionate cost reduction per ton of output: \( \Delta Y/\varepsilon Y - \Delta C/C(1+\Delta Y/Y) = 0.39 - 0.15 = 0.24 \)

- Probability of research success: \( p = 1 \)
- Adoption rate: \( A_t \) (Table 3.17)

- Supply shift: \( K_t = [\Delta Y/\varepsilon Y - \Delta C/C(1+\Delta Y/Y)]pA_tP_b \)
- Proportionate decrease in price: \( E_t = K_t/\varepsilon/e \)

- Proportionate change in population: \( u = 0.027 \) (Senegal, Republic of, Direction de la Prévision et de la Statistique, 1999)
- Proportionate change in per capita income: \( i = 0.0063 \) (average of years 1976-86,1987-97 and 1998-02: -0.011-0.004+0.034/3) (IMF, 1998)
- Income elasticity of demand: \( e_{ii} + \sum e_{ij} + n_i = 0 \rightarrow \text{assuming } \sum e_{ij} = 0, n_i = -e_{ii} = 0.18 \)
- Proportionate change in demand: \( u + in = 0.028 \) (approximation for \( L/Q_o \))

- Initial consumer price (before demand shift): \( P_o = 144 \) FCFA/kg (average of years 1996-1999: 183+137.656+114+142/4) (Senegal, Republic of, Ministère de l’Économie, des Finances et du Plan, 2000 a)
- Final consumer price (after demand shift): \( P = P_o(1 + (L/Q_o)/e) = 167 \) FCFA/kg
- Producer base price: \( P_b = 146.5 \) FCFA/kg (average of years 1996-1999: 131+150+160+145/4) (Senegal, Republic of, Ministère de l’Économie, des Finances et du Plan, 2000 a)

- Change in consumer surplus: \( \Delta CS = EQ(1+\frac{1}{2}Ee/P) \) (parallel and pivotal shift)
- Change in producer surplus: \( \Delta PS = KQ(1+\frac{1}{2}\varepsilon K/P_b) \) (parallel shift) or \( \Delta PS = \frac{1}{2}KQ(1+\varepsilon K/P_b) \) (pivotal shift)
- Change in cost of subsidy: \( \Delta GC = EQ \left(1 + ((P_b-P) + E)e/P \right) \)
- Change in net social welfare: \( \Delta NSW = \Delta CS + \Delta PS - \Delta GC \)

- Cost of salaries: max annual public salary * scientists + minimum annual public salary * number of assistants for each year between 1985 and 1996 (Table 3.18)
- Research costs: \( RC = 0.15*1.2 \) * cost of salaries
- Net total benefits: $NB = \Delta TS – RC$
- Net present value in FCFA: (NB, 0.0625)
- Net present value in US$: NPV in FCFA/exchange rate
6) PEANUT OIL – FORMAL MARKET – WORLD PRICE

- Supply elasticity: $\varepsilon = 0.30$ (Sullivan et al, 1992)
- Demand elasticity: $e = 0.20$ (Sullivan et al, 1992)

- Proportionate yield change per hectare: $\Delta Y/Y = 0.30$ (Ndoye, July 19\textsuperscript{th}, 2000)
- Gross proportionate cost reduction per ton of output: $\Delta Y/eY = 0.30/0.77 = 0.39$
- Proportionate additional cost per hectare: $\Delta C/C = 0.20$ (Table 3.16)
- Proportionate additional cost per ton of output: $\Delta C/C(1+\Delta Y/Y) = 0.20/(1+0.30) = 0.15$
- Net proportionate cost reduction per ton of output: $\Delta Y/eY - \Delta C/C(1+\Delta Y/Y) = 0.39 - 0.15 = 0.24$

- Probability of research success: $p = 1$
- Adoption rate: $A_t$ (Table 3.17)

- Supply shift: $K_t = [\Delta Y/eY - \Delta C/C(1+\Delta Y/Y)]pA_t P_b$
- World price: $P_w = 909$ $\$/ton (average of years 1994-2000: 1,023+991+897+1,009+917+788+740/7) (Senegal, Republic of, Ministère de l’Economie, des Finances et du Plan, 2000 a) $P_w = 909*560.11/1000 = 509$ FCFA/kg (Table 3.15)
- Quantity supplied: $Q = 0.175*599,731 = 104,953$ 1000kg

- Change in consumer surplus: $\Delta CS = 0$
- Change in producer surplus: $\Delta PS = KQ (1 + \frac{1}{2} \varepsilon K/P_w)$ (parallel shift) or $\Delta PS = \frac{1}{2} KQ (1+\varepsilon K/P_w)$ (pivotal shift)
- Change in total surplus: $\Delta TS = \Delta CS + \Delta PS$

- Cost of salaries: max annual public salary * scientists + minimum annual public salary * number of assistants for each year between 1985 and 1996 (Table 3.18)
- Research costs: $RC = 0.175*1.2 *$ cost of salaries
- Net total benefits: $NB = \Delta TS - RC$
- Net present value in FCFA: $(NB, 0.0625)$
- Net present value in US$: $NPV$ in FCFA/exchange rate

- Cost of salaries: max annual public salary * scientists + minimum annual public salary * number of assistants for each year between 1985 and 1996 (Table 3.18)
- Research costs: $RC = 0.175*1.2 *$ cost of salaries
- Net total benefits: $NB = \Delta TS - RC$
- Net present value in FCFA: $(NB, 0.0625)$
- Net present value in US$: $NPV$ in FCFA/exchange rate
7) PEANUT CAKES – FORMAL MARKET – WORLD PRICE

- Supply elasticity: $\varepsilon = 0.30$ (Sullivan et al, 1992)
- Demand elasticity: $e = 0.20$ (Sullivan et al, 1992)

- Proportionate yield change per hectare: $\Delta Y/Y = 0.30$ (Ndoye, July 19th, 2000)
- Gross proportionate cost reduction per ton of output: $\Delta Y/eY = 0.30/0.77 = 0.39$
- Proportionate additional cost per hectare: $\Delta C/C = 0.20$ (Table 3.16)
- Proportionate additional cost per ton of output: $\Delta C/C(1+\Delta Y/Y) = 0.20/(1+0.30) = 0.15$
- Net proportionate cost reduction per ton of output: $\Delta Y/eY \cdot \Delta C/C(1+\Delta Y/Y) = 0.39 - 0.15 = 0.24$

- Probability of research success: $p = 1$
- Adoption rate: $A_t$ (Table 3.17)

- Supply shift: $K_t = [\Delta Y/eY \cdot \Delta C/C(1+\Delta Y/Y)]pA_tP_b$

- World price: $P_w = 160 \$/ton (average of years 1994-2000: $168+169+213+221+116+102+130/7$) (Senegal, Republic of, Ministère de l’Économie, des Finances et du Plan, 2000 a)
  $P_w = 160*560.11/1000 = 90$ FCFA/kg (Table 3.15)

- Quantity supplied: $Q = 0.175*599,731 = 104,953$ 1000kg

- Change in consumer surplus: $\Delta CS = 0$
- Change in producer surplus: $\Delta PS = KQ (1 + \frac{1}{2} \varepsilon K/P_w)$ (parallel shift) or $\Delta PS = \frac{1}{2}KQ (1+\varepsilon K/P_w)$ (pivotal shift)
- Change in total surplus: $\Delta TS = \Delta CS + \Delta PS$

- Cost of salaries: max annual public salary * scientists + minimum annual public salary * number of assistants for each year between 1985 and 1996 (Table 3.18)
- Research costs: $RC = 0.175*1.2 * $cost of salaries
- Net total benefits: $NB = \Delta TS – RC$
- Net present value in FCFA: $(NB, 0.0625)$
- Net present value in US$: $NPV in FCFA/exchange rate$