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# An Analysis of Central Bank Gold Sales and Its Impact on the Gold Mining Industry in Canada

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## Executive Summary

This study looks at the impact of central bank gold sales, including Bank of Canada gold sales, on the gold price.

The gold price has an impact on the gold mining industry in Canada, both in terms of immediate revenue and in terms of future production. In turn, revenue and production have a direct impact on employment, on wages and salaries paid, on materials and supplies purchased, and on gold mining value added – i.e. on the net economic benefit of the activity to the Canadian economy.

It is estimated that a 10% annual increase in the supply of gold will depress the average (nominal) price of gold by about 3.4%. This relationship is used to estimate the impact of central bank gold sales on the price of gold.

It is also estimated that a 10% decline in the gold price will reduce gold production in Canada by about 5.4%. It is estimated that it takes up to 11 years for the full 5.4% decline to be realized however. Gold miners have taken a number of steps in recent years to delay the impact of a lower gold price on production.

The impact on the gold mining industry in Canada of the change in the price of gold resulting from central bank gold sales, plus the change in future production resulting from that change in the price of gold, is shown in the table overleaf.

The table shows that the impact of central bank gold sales on the Canadian gold mining industry is significant! The Canadian gold mining industry's direct revenue losses resulting from central bank gold sales exceed $1150 million (in 2001$) since 1990, for example, while revenue losses resulting from Bank of Canada gold sales only exceed $140 million (in 2001$) since 1990. Revenue losses resulting from Bank of Canada gold sales since the program commenced are in excess of $240 million (in 2001$). Losses of such magnitude could be "life-threatening" for the small communities typically dependent upon gold mining in Canada.

## The impact of central bank gold sales on the gold mining industry in Canada

| | 1999 | 1990-99 | 1990-2001 |
|---|---|---|---|
| All Central Bank Sales | | | |
| Production man-years lost | 166 | 939 | - |
| Total man-years lost | 223 | 1216 | - |
| | | *(million 2001 Cdn$)* | |
| Wages and salaries not paid | 24.7 | 147.6 | - |
| Material and supply inputs not purchased | 38.2 | 200.9 | - |
| Total gold mining valued added lost | 79.9 | 529.8 | - |
| Direct gold mining revenue lost | 104.1 | 934.6 | 1152.2 |
| **Bank of Canada Gold Sales Only** | | | |
| Production man-years lost | 20 | 272 | - |
| Total man-years lost | 28 | 362 | - |
| | | *(million 2001 Cdn$)* | |
| Wages and salaries not paid | 2.7 | 35.9 | - |
| Material and supply inputs not purchased | 4.0 | 46.7 | - |
| Total gold mining valued added lost | 7.0 | 118.0 | - |
| Direct gold mining revenue lost* | 4.2 | 136.1 | 140.7 |

**The direct gold mining revenue lost since Bank of Canada gold sales commenced, 1980-2001, is $240.4 million (2001 Cdn Dollars).*

***Note***: Direct gold mining revenue lost does not take into account current production declines resulting from past central bank-induced gold price declines. Direct gold mining revenue lost is therefore a “lower band” estimate of the total revenue lost as a result of central bank gold sales.

## Introduction

Gold mining plays an important role in Canada's economy. While South Africa is still the largest producer of gold in the world, Canada's annual production ranks 7th. The economic value of gold mining in Canada is estimated to have been about $1.3 billion in 1999, and $15.5 billion for the 10-year period 1990-99. While this represents a significant contribution to the Gross Domestic Product of Canada, such economic value added is often very critical to Canada's remote mining communities that might otherwise not survive.

It follows that the gold price is an important price to many mining communities in Canada. The gold price has a bearing on gold mining profits, on new exploration expenditures, and indeed on the whole pyramid-like economic structure that develops to provide inputs to the gold mining industry.

There are many factors that affect the gold price. One of the critical ones we have uncovered, which is corroborated by others, is the value of the U.S. dollar. When the dollar rises, all else constant, the U.S. dollar price of gold tends to weaken. The reason is that if the gold price did not, gold would rise too much in local currency prices, and reduce gold demand accordingly.

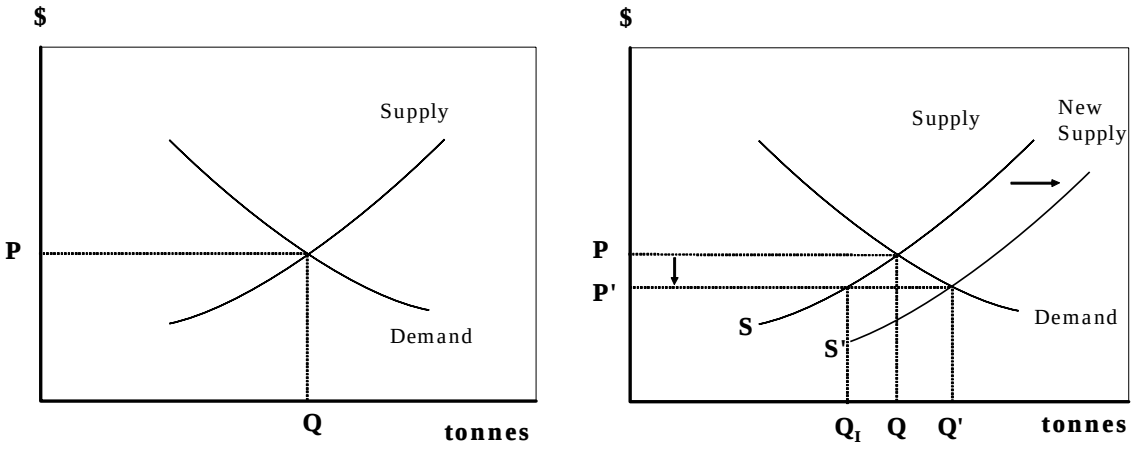
But there are many other factors that affect the gold price as well. World economic activity affects jewelry demand, and inflation tends to affect investment demand for gold. Supply affects the gold price too, of course. A massive increase in annual supply from whatever source, be it related to producer hedging, to improved mining techniques, and/or to central bank sales, will also affect the gold price.

The focus of this study is the supply that comes on the market annually from central banks, and the impact of this supply on the gold price – all else constant. To the degree that there is an impact, this supply has an impact on the world gold mining community in general, and on the Canadian gold mining community in particular. The secondary focus of this study is the gold sold annually by the Bank of Canada, and the impact this supply has had on the gold mining industry in Canada.

*Let me state clearly at the outset that a unilateral decision by a central bank or other financial institution (i.e., the International Monetary Fund) to sell gold from its reserves will lower the price of gold for the duration of the selling period.* In turn, a lower price of gold will affect the gold mining industry negatively, because the gold mining industry will be forced to cut production and/or accept a lower gold price for its (remaining) output. (Only in cases of extremely elastic demand conditions will output not be cut and the price not decline!)

# Diagram 1

A unilateral decision to sell gold reserves affects the gold supply schedule. At any gold price more gold is offered for sale, i.e., the supply schedule shifts outward as shown below.




**Before central bank selling** (the first diagram)

Producers produce Q tonnes of gold
Producers receive P per ounce

**After central bank selling** (the second diagram)

Producers produce $Q_I$ tonnes of gold, $Q_I < Q$
Producers receive P' per ounce, $P' < P$

Central banks sell $(Q' - Q_I)$ tonnes of gold
Central banks receive P' per ounce

**Producers sell less gold and receive a lower price per ounce when central banks sell gold!**

This conclusion comes from standard supply/demand analysis, see Diagram 1. Gold producers produce more gold before central bank sales commence, and sell each ounce of production at a higher price. (Economists will recognize that "producer surplus" is greater before central bank selling than after selling has commenced.)

These broad issues are therefore not in doubt. There is doubt, and there are differing opinions, on exactly how much the price of gold will decline in any given year for each 100 tonnes of gold central banks decide to sell that year. And there are differing opinions on how much a price decline hurts the gold mining industry.

In this analysis we estimate how much the yearly average price of gold declines for any given amount of central bank gold sales that year. We then proceed to estimate how much revenue is foregone by the gold industry in Canada as a result of the central bank-induced price decline. Last we estimate how much central bank gold sales in general, and Bank of Canada gold sales in particular, hurt the Canadian gold mining industry - in terms of employment, wages and salaries, industry value-added, and such.

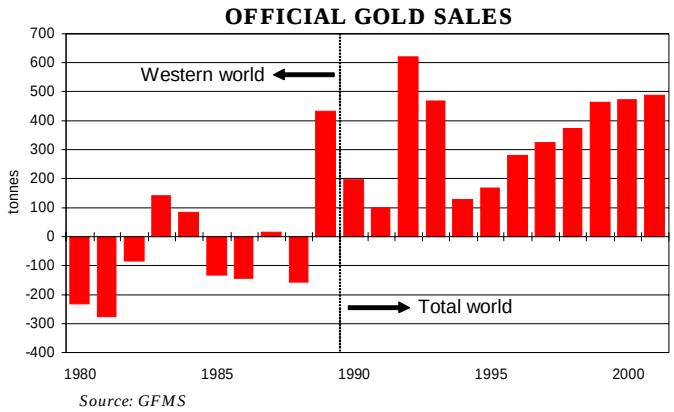
*(All our estimates should be treated as such; statistical analysis, at best, provides only "approximate" answers. Additional data, as they become available, will almost certainly change our estimates marginally - either up or down.)*

## Central Bank Gold Sales

The charts overleaf highlight central bank gold sales since 1980. World data (which excludes the Communist sector gold sales prior to 1987) come from Golds Fields Mineral Services, the accepted source for most gold demand and supply data. The Bank of Canada gold sales data come from the Bank of Canada.

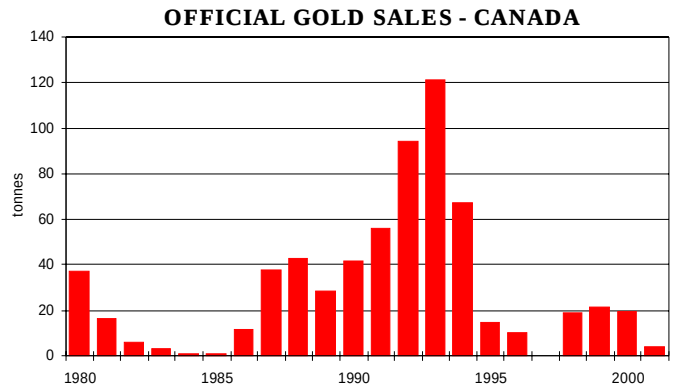
The reader can see from Chart 1 that official gold sales ("official sales" and "central bank sales" are used interchangeably in this report) were extensive in the last 20 years. While Bank of Canada selling has tapered off in recent years (Chart 2), the rest of the world's central banks - and the European central banks specifically - have increased their gold sales in recent years. The September 1999 Central Bank Agreement, limiting gold sales from 15 European countries to 400 tonnes per annum through 2004, accounts for the slower rate of increase in official gold sales since 1999. (The Agreement is likely to be extended in 2004, but this is not certain.)

**Chart 1**




*Source: GFMS*

**Chart 2**




*Source: Bank of Canada*

## The Impact of Central Bank Gold Sales on the Gold Price

We have developed a model of the gold price in order to estimate the impact of official gold sales on the gold price. The model is discussed in Appendix 2. Suffice it to note here that a 10% increase in annual gold supply will tend to lower the annual average gold price by approximately 3.4%, all else constant. In other words, given that annual world supply is currently in the order of 3500 tonnes, a 350 tonne addition to that supply would depress the price of gold by about 3.4%, or about $9-$10. (A decrease of similar magnitude in annual supply would raise the annual average price of gold by a like amount.)

Table 1 presents data for central bank gold sales and its impact on the Canadian gold industry's revenue since 1980.

For example, central bank gold sales totaled 504 tonnes in 2001, which raised the annual supply of gold by 16.9% over what it would have been. The price impact of this increase in supply was -5.74% or $-14.72/oz. The industry produced 157 tonnes in 2001. The lost revenue was therefore US$74.32 million as a result of central bank gold sales, or Cdn$115.12 million.

# Table 1 - All Central Bank Gold Sales

| Date | Gold Price $/oz | Annual Gold Supply tonnes | Central Bank Gold sales tonnes | CB Sales % of Annual Supply | CB Sales impact on price % | CB Sales impact on price US$/oz | Canada Gold Production tonnes | Industry Revenue Impact $000,000 | Industry Revenue Impact $000,000cdn | Impact in 2001$'s $000,000cdn |
|---|---|---|---|---|---|---|---|---|---|---|
| **1980** | 614.50 | 970 | -230 | -19.2 | 6.52 | 42.84 | 49.0 | 67.45 | 78.86 | 175.18 |
| **1981** | 459.24 | 1504 | -276 | -15.5 | 5.27 | 25.56 | 47.0 | 38.66 | 46.35 | 91.59 |
| **1982** | 375.17 | 1587 | -85 | -5.1 | 1.73 | 6.60 | 64.7 | 13.74 | 16.95 | 30.21 |
| **1983** | 423.61 | 1326 | 142 | 12.0 | -4.08 | -16.59 | 73.5 | -39.21 | -48.33 | -81.41 |
| **1984** | 360.78 | 1846 | 85 | 4.8 | -1.64 | -5.82 | 83.4 | -15.62 | -20.24 | -32.67 |
| **1985** | 317.26 | 1868 | -132 | -6.6 | 2.24 | 7.28 | 87.6 | 20.50 | 27.99 | 43.44 |
| **1986** | 367.85 | 2023 | -145 | -6.7 | 2.27 | 8.56 | 102.9 | 28.32 | 39.35 | 58.64 |
| **1987** | 446.22 | 1973 | 18 | 0.9 | -0.31 | -1.38 | 117.2 | -5.19 | -6.88 | -9.83 |
| **1988** | 436.87 | 2438 | -155 | -6.0 | 2.03 | 9.07 | 135.9 | 39.64 | 48.79 | 66.97 |
| **1989** | 380.79 | 2899 | 434 | 17.6 | -5.99 | -21.52 | 159.5 | -110.40 | -130.71 | -170.96 |
| **1990** | 383.59 | 2719 | 198 | 7.9 | -2.67 | -9.99 | 169.4 | -54.40 | -63.47 | -79.19 |
| **1991** | 362.26 | 2868 | 100 | 3.6 | -1.23 | -4.40 | 175.7 | -24.83 | -28.45 | -33.62 |
| **1992** | 343.95 | 3181 | 622 | 24.3 | -8.27 | -26.27 | 161.4 | -136.34 | -164.80 | -191.82 |
| **1993** | 359.82 | 2932 | 468 | 19.0 | -6.46 | -21.83 | 153.3 | -107.59 | -138.81 | -158.71 |
| **1994** | 384.15 | 3016 | 130 | 4.5 | -1.53 | -5.79 | 146.9 | -27.36 | -37.37 | -42.64 |
| **1995** | 384.05 | 3345 | 167 | 5.3 | -1.79 | -6.74 | 152.0 | -32.95 | -45.22 | -50.52 |
| **1996** | 387.87 | 3285 | 279 | 9.3 | -3.16 | -11.87 | 166.4 | -63.48 | -86.55 | -95.14 |
| **1997** | 331.29 | 3887 | 326 | 9.2 | -3.11 | -10.00 | 171.4 | -55.10 | -76.29 | -82.53 |
| **1998** | 294.07 | 3592 | 380 | 11.8 | -4.02 | -11.37 | 165.6 | -60.54 | -89.82 | -96.27 |
| **1999** | 278.56 | 3763 | 478 | 14.6 | -4.95 | -13.13 | 157.6 | -66.55 | -98.87 | -104.14 |
| **2000** | 279.11 | 3731 | 489 | 15.1 | -5.13 | -13.61 | 153.8 | -67.31 | -99.97 | -102.52 |
| **2001** | 271.07 | 3488 | 504 | 16.9 | -5.74 | -14.72 | 157.0 | -74.32 | -115.12 | -115.12 |
| **2002** | | | | | | | | | | |
| | | | | | | **1980-2001** | | | | |
| **Total** | | **58241.0** | **3797.4** | | | | **2851.3** | **-732.9** | **-992.6** | **-981.0** |
| | | | | | | **1990-2001** | | | | |
| **Total** | | **39806.8** | **4141.5** | | | | **1930.5** | **-770.8** | **-1044.7** | **-1152.2** |
| | | | | | | **1990-1999** | | | | |
| **Total** | | **32587.7** | **3148.5** | | | | **1619.7** | **-629.1** | **-829.6** | **-934.6** |

*Sources: Gold Fields Mineral Services, M. Murenbeeld & Associates Inc., Bank of Canada, Natural Resources Canada*

For the period 1990-2001, central bank gold sales reduced mining revenues by a cumulative US$770.8 million, or Cdn$1152.2 million in 2001 Dollars.

Table 2 presents similar data for Bank of Canada gold sales. While Bank of Canada gold sales appear small in light of total world central bank gold sales, Bank of Canada gold sales in 2000, for example, still represent some 12.6% of Canada's gold output for that year. Furthermore, the $-.49/oz gold price impact of Bank of Canada gold sales in 2000 meant the industry lost US$2.44 million of revenue in 2000, or Cdn$3.63 million. For the period 1990-2001 Bank of Canada gold sales reduced mining revenues by a cumulative US$96.0 million, or Cdn$140.7 million in 2001 Dollars.

*These estimates of lost revenue are likely to be low estimates furthermore, because production that was not undertaken as a result of central bank gold sales is not considered.* Had there been no central bank sales at all over the last 22 years, Canadian gold output would have been higher than indicated. This fact also makes the revenue loss estimates not directly comparable to the disaggregated losses estimated separately, including mining value added losses.

## The Impact of the Gold Price on the Gold Mining Industry

The basic economic model shows that a decline in the gold price has an impact on the gold mining industry. Tables 1 and 2 present some estimates of industry revenue losses as a result of the decline in the gold price induced by official sales. But what of the impact on employment, wages, and such?

In this section we estimate directly the impact of the gold price on industry variables, including employment levels, wages paid, materials and supplies purchased by the industry, and the value added by the gold mining industry.

First however, we note that the gold price affects the gold mining industry in two ways: it affects current revenues and it affects future production. As the industry's revenues change in response to the gold price, the industry's profits, ability to invest, retain employees, etc. all change.

Production is affected by the gold price, but only with a time lag. We estimate (see Appendix 3) that the lag is in the order of 8-11 years, meaning that a decline in the price of gold this year will affect production negatively 8-11 years hence. This lag will strike the reader as rather long, and indeed it has lengthened in recent years. For many

# Table 2 - Bank of Canada Gold Sales

| Date | Gold Price $/oz | Canada Gold Production tonnes | Bank of Canada Gold sales tonnes | BoC sales as % of Canada Production | BoC sales % of Annual Gold Supply | BoC sales impact on price % | BoC sales impact on price US$/oz | Industry Revenue Impact $000,000 | Industry Revenue Impact $000,000cdn | Impact in 2001$'s $000,000cdn |
|---|---|---|---|---|---|---|---|---|---|---|
| **1980** | 614.50 | 49.0 | 37.18 | 75.9 | 4.0 | -1.36 | -8.22 | -12.94 | -15.13 | -33.60 |
| **1981** | 459.24 | 47.0 | 16.12 | 34.3 | 1.1 | -0.37 | -1.69 | -2.55 | -3.06 | -6.04 |
| **1982** | 375.17 | 64.7 | 6.21 | 9.6 | 0.4 | -0.13 | -0.50 | -1.04 | -1.28 | -2.29 |
| **1983** | 423.61 | 73.5 | 2.89 | 3.9 | 0.2 | -0.07 | -0.31 | -0.74 | -0.92 | -1.54 |
| **1984** | 360.78 | 83.4 | 1.04 | 1.2 | 0.1 | -0.02 | -0.07 | -0.19 | -0.24 | -0.39 |
| **1985** | 317.26 | 87.6 | 0.95 | 1.1 | 0.1 | -0.02 | -0.05 | -0.15 | -0.21 | -0.33 |
| **1986** | 367.85 | 102.9 | 11.89 | 11.6 | 0.6 | -0.20 | -0.74 | -2.44 | -3.39 | -5.06 |
| **1987** | 446.22 | 117.2 | 37.50 | 32.0 | 1.9 | -0.66 | -2.92 | -11.01 | -14.60 | -20.85 |
| **1988** | 436.87 | 135.9 | 42.90 | 31.6 | 1.8 | -0.61 | -2.64 | -11.55 | -14.22 | -19.52 |
| **1989** | 380.79 | 159.5 | 28.51 | 17.9 | 1.0 | -0.34 | -1.28 | -6.57 | -7.78 | -10.18 |
| **1990** | 383.59 | 169.4 | 41.57 | 24.5 | 1.6 | -0.53 | -2.01 | -10.97 | -12.80 | -15.97 |
| **1991** | 362.26 | 175.7 | 55.99 | 31.9 | 2.0 | -0.68 | -2.44 | -13.76 | -15.76 | -18.63 |
| **1992** | 343.95 | 161.4 | 93.95 | 58.2 | 3.0 | -1.03 | -3.52 | -18.28 | -22.10 | -25.72 |
| **1993** | 359.82 | 153.3 | 120.97 | 78.9 | 4.3 | -1.46 | -5.19 | -25.58 | -33.00 | -37.73 |
| **1994** | 384.15 | 146.9 | 67.43 | 45.9 | 2.3 | -0.78 | -2.96 | -14.00 | -19.11 | -21.81 |
| **1995** | 384.05 | 152.0 | 14.62 | 9.6 | 0.4 | -0.15 | -0.57 | -2.80 | -3.84 | -4.29 |
| **1996** | 387.87 | 166.4 | 10.17 | 6.1 | 0.3 | -0.11 | -0.41 | -2.19 | -2.98 | -3.28 |
| **1997** | 331.29 | 171.4 | 0.00 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **1998** | 294.07 | 165.6 | 18.66 | 11.3 | 0.5 | -0.18 | -0.52 | -2.78 | -4.12 | -4.41 |
| **1999** | 278.56 | 157.6 | 21.18 | 13.4 | 0.6 | -0.19 | -0.54 | -2.71 | -4.03 | -4.24 |
| **2000** | 279.11 | 153.8 | 19.35 | 12.6 | 0.5 | -0.18 | -0.49 | -2.44 | -3.63 | -3.72 |
| **2001** | 271.07 | 157.0 | 4.11 | 2.6 | 0.1 | -0.04 | -0.11 | -0.55 | -0.85 | -0.85 |
| **2002** | | | | | | | | | | |
| | | | | | | **1980-2001** | | | | |
| **Total** | | **2851.3** | **653.2** | | | | **-37.2** | **-145.2** | **-183.0** | **-240.4** |
| | | | | | | **1980-1999** | | | | |
| **Total** | | **2540.5** | **629.7** | | | | **-36.6** | **-142.2** | **-178.6** | **-235.9** |
| | | | | | | **1990-2001** | | | | |
| **Total** | | **1930.5** | **468.0** | | | | **-18.8** | **-96.0** | **-122.2** | **-140.7** |
| | | | | | | **1990-1999** | | | | |
| **Total** | | **1619.7** | **444.5** | | | | **-18.2** | **-93.1** | **-117.7** | **-136.1** |

*Sources: Gold Fields Mineral Services, M. Murenbeeld & Associates Inc., Bank of Canada, Natural Resources Canada*

years it was thought that the "normal" lag time was about 5 years, meaning it would take the industry (together with the appropriate regulatory bodies) about 5 years to bring a new mine on stream in response to higher gold prices. Ditto, companies have generally been loathe to close mines for reasons of employee hardship, perennial optimism about the future price of gold, and because the cost of restarting a closed mine in the event the gold price did rise again is generally very significant.

The lag has lengthened in recent years beyond the "normal" time because of a number of new factors. In the first instance the regulatory approvals have taken longer, owing to the public desire for environmental impact studies and such. In the second instance mining techniques have been adapted so that "high grading" and "low grading" is more pervasive; a miner mines higher-grade ore when the price is low and a lower-grade ore when the price is high, thereby extending mine life over a price cycle. Not to be overlooked is the practice of hedging price risk. Gold prices are inherently volatile. Financial products once only available for the treasurer facing currency risk have been adapted to the gold miner to deal with gold price risk. Insulating the gold miner from gold price risk also has the tendency to lengthen the time of the miner's response to a different price environment.

Table 3 overleaf provides estimates of just how much a decline in the gold price affects future production.

**Chart 3**

**CANADIAN GOLD PRODUCTION VS THE GOLD PRICE**

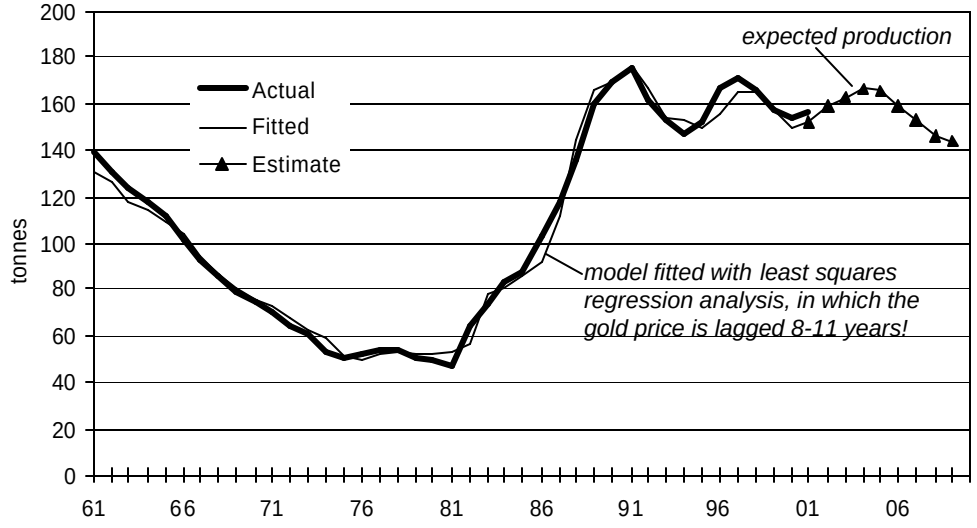


**Table 3 - Gold Impact on Future Production**

A 10% decline in the (Cdn$) gold price this year reduces output:

| | | |
|---|---|---|
| 8 years hence | by | 0.9% |
| 9 years hence | by | 2.0% |
| 10 years hence | by | 1.0% |
| 11 years hence | by | 1.5% |
| in total | by | 5.4% |

The next question, then, is how some key industry variables - including the number of employees, wages paid, and gold mining value added - are affected by a decline in the gold price and by a decline in production induced by previous years' gold price declines.

Table 4 presents our estimates of how key industry variables are affected by changes in the gold price and in production. (The estimates are derived from least square regression analysis - see Table 6 in Appendix 4.) Table 4 indicates, for example, that if the gold price were to fall by 10% this year, the number of production workers would fall by about .6% this year and a further 3.4% next year. If gold production were to fall 10% in the current year the number of production workers would fall by 6.9% in the current year, and by a further 1.6% next year.

We need Tables 3 and 4 in order to estimate the full impact of a central bank-induced decline in the gold price on the Canadian gold mining industry. A decline in the gold price this year has an impact on the number of workers the industry retains this year and next year, and on the level of production eight, nine, ten, and eleven years hence - which in turn affects the retention of production workers then. Similarly, the number of production workers this year is less than it might have been because the gold price declined 8-11 years ago as a result of central bank gold sales at that time.

**Table 4 - Gold Impact on Future Production**

A 10% decline **in the gold price** (Cdn$) this year reduces by:

| | this year (%) | next year (%) |
|---|---|---|
| number of workers | 0.6 | 3.4 |
| wages paid | 1.7 | 5.1 |
| total employment | 0.8 | 3.2 |
| total wages & salaries | 1.9 | 4.9 |
| fuel/electricity inputs | 0.9 | 3.6 |
| all material inputs | 3.1 | 5.5 |
| proven and probable reserves | 5.0 | - |
| gold mining value added | 8.9 | 0.5 |

A 10% decline **in gold production** this year reduces by:

| | this year (%) | next year (%) |
|---|---|---|
| number of workers | 6.9 | 1.6 |
| wages paid | 9.9 | 1.3 |
| total employment | 7.5 | 1.5 |
| total wages & salaries | 10.8 | 0.8 |
| fuel/electricity inputs | 11.4 | 0.2 |
| all material inputs | 11.6 | 2.7 |
| proven and probable reserves | 6.8 | - |
| gold mining value added | 9.3 | 1.9 |

Tables 5 and 6 present the estimates of the impact of central bank-induced declines in the gold price on a number of industry variables.

In Table 5 the impact of all central bank-induced declines in the gold price are noted, by year, on the number of production workers employed in the gold mining industry, on the total employment in the industry, on all wages and salaries paid, on material and supply inputs, and on the gold mining industry's value added.

For example, in the year 1999 the combined impact on production workers from the (central bank-induced) decline in the gold price in 1998 and 1999, plus the decline in production in 1998 and 1999 resulting from (central bank-induced) declines in the gold price in 1987-1991 was a negative 166. In other words, the total number of production workers in 1999 was 166 below what it would have been had there been no central bank gold sales at all that year and in the 12 previous years. (How this estimate is derived can be found in Appendix 4.)

## Table 5

**ALL CENTRAL BANK GOLD SALES**

| Date | Impact on production (ounces) | Impact on Workers (number) | Impact on all Employment (number) | Impact on Sal.+Wage 2001 $'s (000$) | Impact on Material & Supplies 2001 $'s (000$) | Impact on Value Added 2001 $'s (000$) |
|---|---|---|---|---|---|---|
| 1980 | | | | | | 75281 |
| 1981 | | | | | | 51746 |
| 1982 | | | | | | 18283 |
| 1983 | | | | | | -41135 |
| 1984 | | | | | | -17905 |
| 1985 | | | | | | 18839 |
| 1986 | | | | | | 31135 |
| 1987 | | | | | | -2922 |
| 1988 | 26200 | 43 | 66 | 6397 | 8246 | 45032 |
| 1989 | 90586 | 165 | 199 | 14061 | 10446 | -64146 |
| 1990 | 101459 | -62 | -56 | -9743 | -10141 | -11400 |
| 1991 | 82003 | 27 | 45 | 1311 | 2433 | 9269 |
| 1992 | -1010 | -52 | -85 | -13187 | -17662 | -108409 |
| 1993 | -14499 | -243 | -314 | -34107 | -43412 | -107301 |
| 1994 | -5015 | -176 | -221 | -21788 | -27686 | -34359 |
| 1995 | 20529 | -28 | -34 | -4073 | -6198 | -23780 |
| 1996 | 36727 | -21 | -26 | -4643 | -7909 | -44268 |
| 1997 | 8527 | -78 | -104 | -13558 | -19252 | -45214 |
| 1998 | -69320 | -142 | -199 | -23197 | -32858 | -84406 |
| 1999 | -49989 | -166 | -223 | -24677 | -38248 | -79908 |
| 2000 | -109564 | | | | | |
| 2001 | -144331 | | | | | |
| 2002 | | | | | | |
| **SUM: 1990-2001** | | | | | | |
| | **-144481** | **-939** | **-1216** | **-147662** | **-200933** | **-529774** |

## Table 6

**BANK OF CANADA GOLD SALES**

| Date | BoC Impact on production (ounces) | Impact on Workers (number) | Impact Production Employment (number) | Impact on Sal.+Wage 2001 $'s (000$) | Impact on Material & Supplies 2001 $'s (000$) | Impact on Value Added 2001 $'s (000$) |
|---|---|---|---|---|---|---|
| 1980 | | | | | | -15655 |
| 1981 | | | | | | -4102 |
| 1982 | | | | | | -1392 |
| 1983 | | | | | | -851 |
| 1984 | | | | | | -224 |
| 1985 | | | | | | -162 |
| 1986 | | | | | | -2614 |
| 1987 | | | | | | -11184 |
| 1988 | -5488 | -35 | -45 | -4247 | -5054 | -13251 |
| 1989 | -15768 | -47 | -60 | -5456 | -5814 | -12009 |
| 1990 | -12419 | -34 | -44 | -4064 | -4907 | -15043 |
| 1991 | -15321 | -38 | -51 | -4934 | -5713 | -16884 |
| 1992 | -4391 | -29 | -39 | -4044 | -5252 | -16483 |
| 1993 | -1615 | -33 | -44 | -4787 | -6415 | -23316 |
| 1994 | -1652 | -41 | -53 | -5329 | -6936 | -14934 |
| 1995 | -5187 | -27 | -35 | -3325 | -4017 | -5116 |
| 1996 | -11379 | -17 | -24 | -2190 | -2951 | -6514 |
| 1997 | -13902 | -18 | -25 | -2362 | -3310 | -4789 |
| 1998 | -14767 | -15 | -22 | -2151 | -3185 | -7989 |
| 1999 | -14895 | -20 | -28 | -2696 | -3997 | -7023 |
| 2000 | -16681 | | | | | |
| 2001 | -24921 | | | | | |
| 2002 | | | | | | |
| **SUM: 1990-2001** | | | | | | |
| | **-137131** | **-272** | **-362** | **-35880** | **-46683** | **-118091** |

The same results for Bank of Canada-induced declines in the gold price are presented in Table 6. The impact on the number of production workers, salaries and wages paid, etc., is much smaller in Table 6, of course, because Bank of Canada gold sales are much smaller than world central bank gold sales. Nevertheless, there is a measurable impact.

Indeed, the mining value added lost since 1990 as a result of Bank of Canada gold sales is Cdn$118.1 million in 2001 Dollars.

## Conclusion

We have shown that central bank gold sales affect the gold price negatively. We have also shown that the gold price affects revenue and production, the latter with a long lag.

We have furthermore shown that key industry variables, including number of production workers, salaries and wages paid, and mining value added, are affected by current and previous year's production and gold price.

Last, we have made estimates of the revenue forgone by the gold mining industry in Canada as a result of all central bank gold sales, and as a result of Bank of Canada gold sales in particular. These estimates are in general agreement with estimates of mining value-added lost as a result of central bank gold sales.

### The impact of central bank gold sales on the gold mining industry in Canada

| | 1999 | 1990-99 |
|---|---|---|
| **All Central Bank Sales** | | |
| Production man-years lost | 166 | 939 |
| Total man-years lost | 223 | 1216 |
| | *(million $2001$)* | |
| Wages and salaries not paid | 24.7 | 147.6 |
| Material and supply inputs not purchased | 38.2 | 200.9 |
| Total gold mining valued added lost | 79.9 | 529.8 |
| Direct gold mining revenue lost | 104.1 | 934.6 |
| **Bank of Canada Gold Sales Only** | | |
| Production man-years lost | 20 | 272 |
| Total man-years lost | 28 | 362 |
| | *(million $2001$)* | |
| Wages and salaries not paid | 2.7 | 35.9 |
| Material and supply inputs not purchased | 4.0 | 46.7 |
| Total gold mining valued added lost | 7.0 | 118.0 |
| Direct gold mining revenue lost | 4.2 | 136.1 |

***Note***: Direct gold mining revenue lost does not take into account current production declines resulting from past central bank-induced gold price declines. Direct gold mining revenue lost is therefore a "lower band" estimate of the total revenue lost as a result of central bank gold sales.

# Appendix

1. The Canadian Gold Mining Industry

2. A Model of the Gold Price

3. A Model of Canadian Gold Production

4. Estimates of Central Bank Gold Sales on Industry Variables

5. Computer Printout of Models

# 1. THE CANADIAN GOLD MINING INDUSTRY

## Data Used in the Analysis

**GO** - Price of Gold, US$, average for year

**CDN** - Canadian Dollar per US$, average for year

**PRODCA** - Total annual gold production, kg

**RESCA** - Proven and Probable Reserves, year-end in tonnes

**ESTAB** - Number of Establishments

**WORKERS** - Production and Related Workers, number

**WAGES** - Production and Related Workers, Wages paid ($000)

**HOURS** - Production and Related Workers, person hours paid (000hr)

**PRODVA** - Gold Mines, Value of Production ($000)

**MINEVA** - Gold Mining Activity, Value Added($000)

**FUEL** - Cost of Fuel and Electricity Inputs ($000)

**MATERIAL** - Cost of Materials & Supply Inputs ($000)

**TOTEMP** - Total Number of Employees (including salaried personnel)

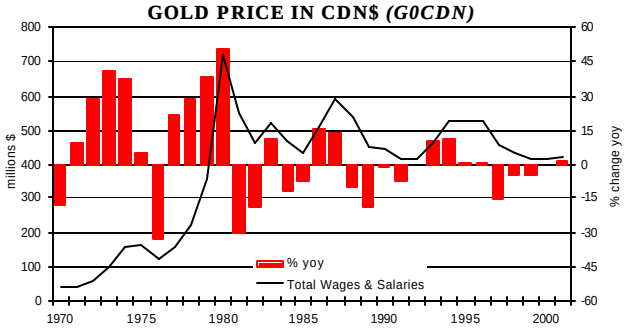
**TOTWS** - Total Wages and Salaries ($000)

**WAGEHR** - WAGES/HOURS, an estimate of hourly wages

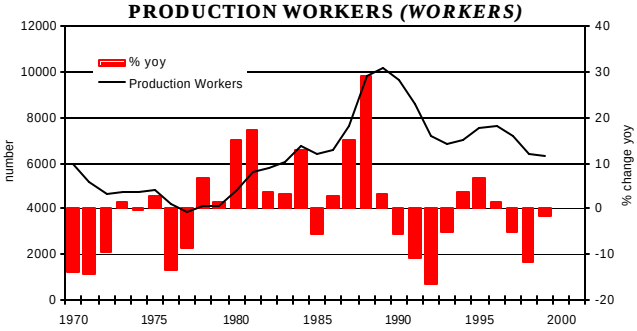
**RWAGEHR** - WAGEHR divided by inflation index,an estimate of real hourly wages

**CPI** - Consumer Price Index, Canada, 1992 = 100

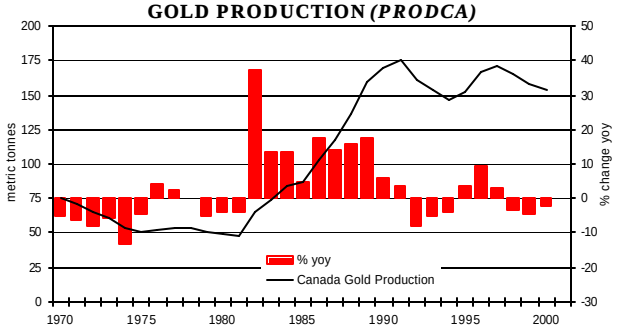
**GOLD PRICE IN CDN$ *(G0CDN)***



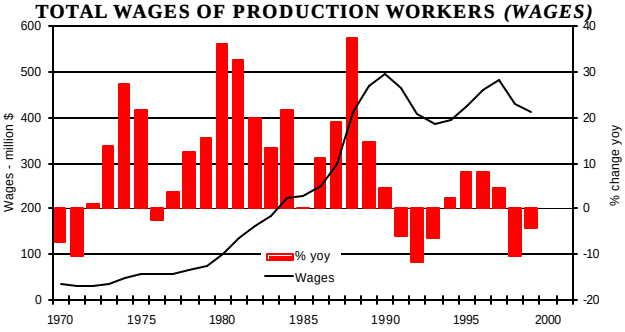

**PRODUCTION WORKERS *(WORKERS)***



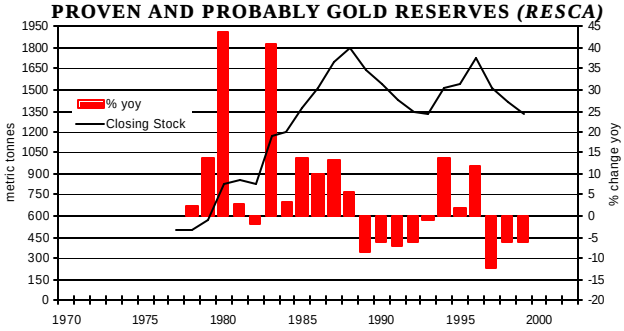

**GOLD PRODUCTION *(PRODCA)***



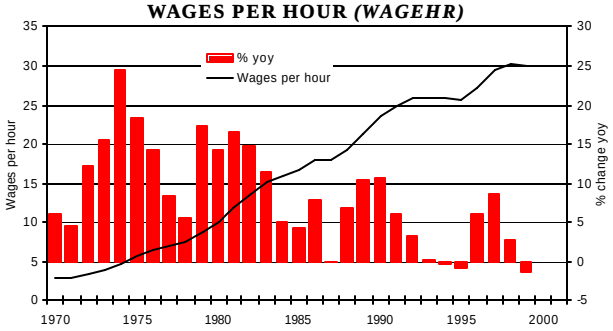

**TOTAL WAGES OF PRODUCTION WORKERS *(WAGES)***



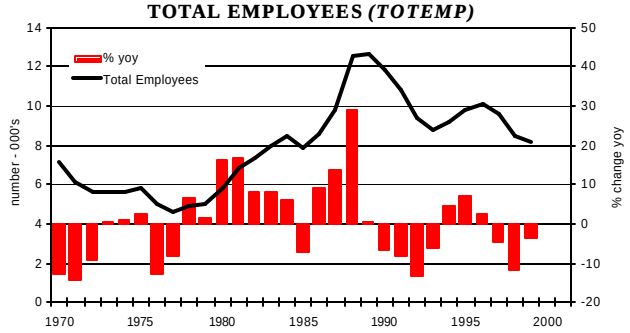

**PROVEN AND PROBABLY GOLD RESERVES *(RESCA)***



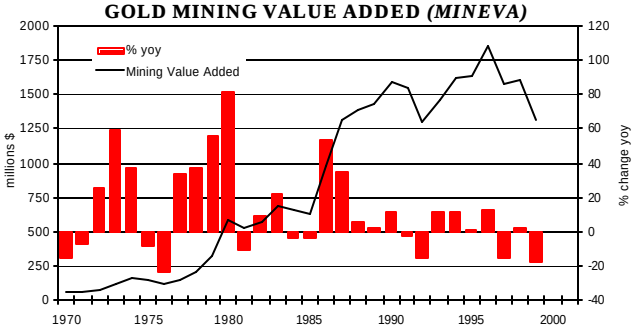

**WAGES PER HOUR *(WAGEHR)***



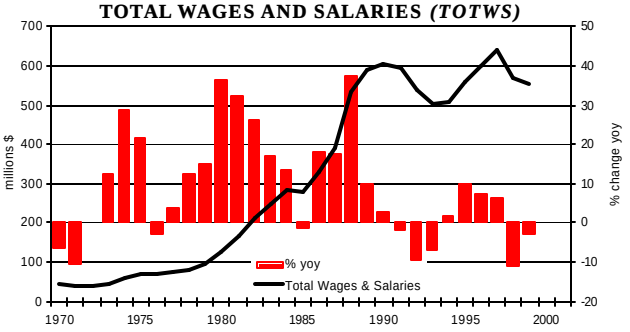
**TOTAL EMPLOYEES *(TOTEMP)***



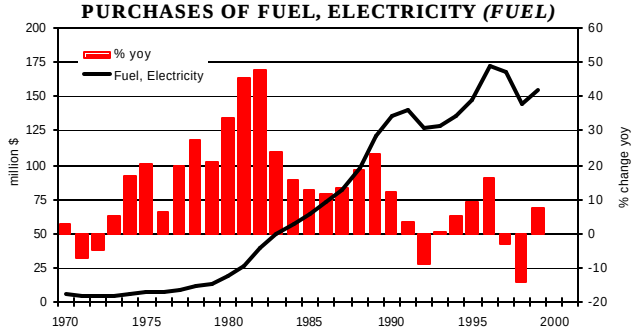

**GOLD MINING VALUE ADDED *(MINEVA)***



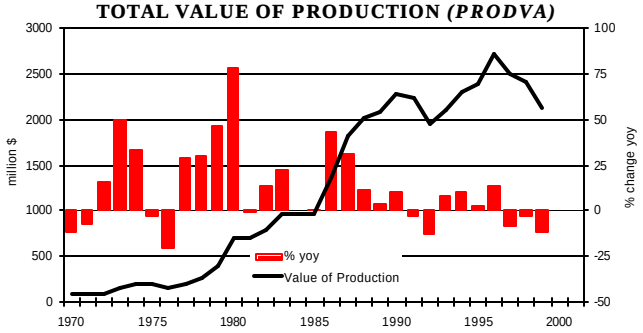

**TOTAL WAGES AND SALARIES *(TOTWS)***



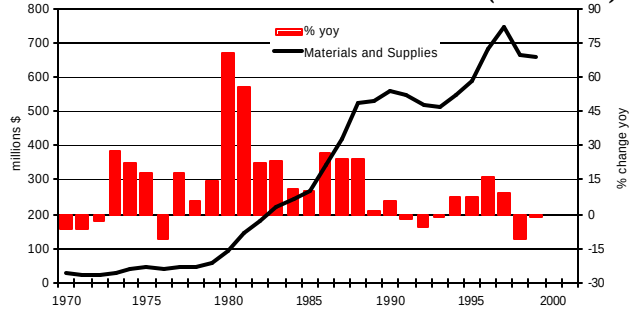

**PURCHASES OF FUEL, ELECTRICITY *(FUEL)***




**TOTAL VALUE OF PRODUCTION *(PRODVA)***




**PURCHASE OF MATERIALS AND SUPPLIES *(MATERIAL)***

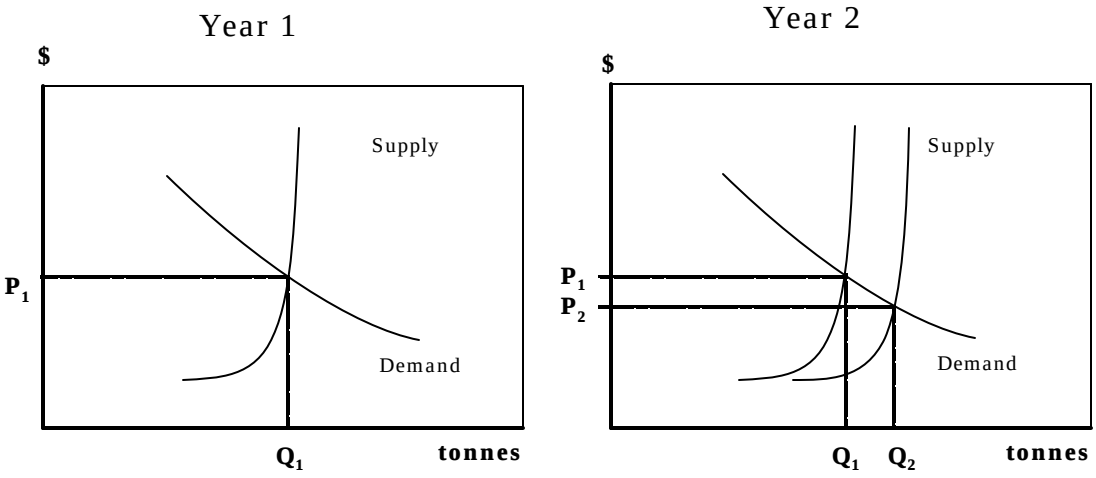


| DATE | GO | CDN | PRODCA | RESCA | ESTAB | WORKERS | WAGES | HOURS | WAGEHR |
|---|---|---|---|---|---|---|---|---|---|
| 1948 | 35.00 | 1.091 | 109735 | - | - | - | - | - | |
| 1949 | 35.00 | 1.077 | 128272 | - | - | - | - | - | |
| 1950 | 35.00 | 1.093 | 138101 | - | - | - | - | - | |
| 1951 | 35.00 | 1.053 | 136637 | - | - | - | - | - | |
| 1952 | 35.00 | 0.979 | 139065 | - | - | - | - | - | |
| 1953 | 35.00 | 0.984 | 126154 | - | - | - | - | - | |
| 1954 | 35.04 | 0.973 | 135797 | - | - | - | - | - | |
| 1955 | 35.02 | 0.986 | 141241 | - | - | - | - | - | |
| 1956 | 34.98 | 0.984 | 136325 | - | - | - | - | - | |
| 1957 | 34.95 | 0.959 | 137943 | - | - | - | - | - | |
| 1958 | 35.09 | 0.971 | 142143 | - | - | - | - | - | |
| 1959 | 35.09 | 0.959 | 139436 | - | - | - | - | - | |
| 1960 | 35.26 | 0.970 | 143946 | - | - | - | - | - | |
| 1961 | 35.17 | 1.013 | 139125 | - | 72 | 13895 | 54597 | 30319 | 1.80 |
| 1962 | 35.11 | 1.069 | 129981 | - | 76 | 13304 | 53760 | 29318 | 1.83 |
| 1963 | 35.08 | 1.079 | 123543 | - | 75 | 12660 | 52087 | 28471 | 1.83 |
| 1964 | 35.08 | 1.079 | 118162 | - | 71 | 12020 | 52174 | 27485 | 1.90 |
| 1965 | 35.13 | 1.078 | 111568 | - | 77 | 11213 | 50072 | 24709 | 2.03 |
| 1966 | 35.07 | 1.077 | 101832 | - | 76 | 9835 | 47650 | 21094 | 2.26 |
| 1967 | 35.21 | 1.079 | 92128 | - | 67 | 8698 | 43750 | 18182 | 2.41 |
| 1968 | 38.69 | 1.078 | 85316 | - | 54 | 7634 | 40593 | 15663 | 2.59 |
| 1969 | 41.23 | 1.077 | 79158 | - | 46 | 6959 | 39148 | 14340 | 2.73 |
| 1970 | 35.95 | 1.044 | 74928 | - | 41 | 5990 | 36235 | 12505 | 2.90 |
| 1971 | 40.83 | 1.010 | 70325 | - | 45 | 5138 | 32571 | 10743 | 3.03 |
| 1972 | 58.29 | 0.990 | 64632 | - | 38 | 4663 | 32902 | 9668 | 3.40 |
| 1973 | 97.32 | 1.000 | 60777 | - | 21 | 4727 | 37438 | 9526 | 3.93 |
| 1974 | 158.73 | 0.978 | 52813 | - | 22 | 4716 | 47597 | 9733 | 4.89 |
| 1975 | 160.87 | 1.017 | 50511 | - | 23 | 4841 | 57883 | 9993 | 5.79 |
| 1976 | 124.77 | 0.986 | 52621 | - | 19 | 4200 | 56571 | 8540 | 6.62 |
| 1977 | 147.79 | 1.064 | 53923 | 491 | 18 | 3837 | 58542 | 8142 | 7.19 |
| 1978 | 193.44 | 1.141 | 53966 | 505 | 18 | 4094 | 65788 | 8655 | 7.60 |
| 1979 | 304.54 | 1.171 | 51143 | 577 | 21 | 4155 | 75979 | 8521 | 8.92 |
| 1980 | 614.52 | 1.169 | 48975 | 823 | 27 | 4781 | 103293 | 10132 | 10.19 |
| 1981 | 459.45 | 1.199 | 47046 | 848 | 33 | 5600 | 136782 | 11510 | 11.88 |
| 1982 | 375.48 | 1.234 | 64736 | 836 | 39 | 5809 | 163619 | 11992 | 13.64 |
| 1983 | 423.32 | 1.232 | 73512 | 1177 | 40 | 6005 | 185431 | 12179 | 15.23 |
| 1984 | 360.42 | 1.295 | 83445 | 1211 | 44 | 6773 | 225635 | 14112 | 15.99 |
| 1985 | 317.32 | 1.366 | 87561 | 1371 | 41 | 6412 | 226230 | 13558 | 16.69 |
| 1986 | 367.97 | 1.390 | 102900 | 1511 | 46 | 6598 | 251446 | 13976 | 17.99 |
| 1987 | 446.22 | 1.326 | 117227 | 1695 | 51 | 7598 | 299136 | 16612 | 18.01 |
| 1988 | 436.86 | 1.231 | 135889 | 1804 | 65 | 9813 | 410600 | 21339 | 19.24 |
| 1989 | 380.81 | 1.184 | 159527 | 1645 | 70 | 10130 | 469884 | 22117 | 21.25 |
| 1990 | 383.58 | 1.167 | 169412 | 1540 | 66 | 9591 | 492259 | 20943 | 23.50 |
| 1991 | 362.28 | 1.146 | 175709 | 1428 | 60 | 8563 | 463010 | 18555 | 24.95 |
| 1992 | 343.93 | 1.209 | 161402 | 1347 | 50 | 7166 | 408532 | 15841 | 25.79 |
| 1993 | 359.82 | 1.290 | 153299 | 1331 | 50 | 6795 | 382991 | 14803 | 25.87 |
| 1994 | 384.25 | 1.366 | 146891 | 1509 | 48 | 7033 | 392175 | 15196 | 25.81 |
| 1995 | 384.13 | 1.372 | 152032 | 1538 | 50 | 7492 | 422911 | 16526 | 25.59 |
| 1996 | 387.90 | 1.364 | 166378 | 1728 | 55 | 7595 | 457762 | 16846 | 27.17 |
| 1997 | 331.34 | 1.385 | 171376 | 1504 | 56 | 7207 | 479347 | 16245 | 29.51 |
| 1998 | 294.07 | 1.484 | 165599 | 1423 | 47 | 6374 | 430039 | 14178 | 30.33 |
| 1999 | 278.56 | 1.486 | 157617 | 1326 | 45 | 6279 | 411956 | 13741 | 29.98 |
| 2000 | 279.11 | 1.485 | 153781 | 577 | - | - | - | - | |
| 2001 | 271.07 | 1.547 | 157015 | - | - | - | - | - | |

| DATE | RWAGEHR | TOTEMP | TOTWS | FUEL | MATERIAL | PRODVA | MINEVA | VALADD | CPI |
|---|---|---|---|---|---|---|---|---|---|
| 1948 | | - | - | - | - | - | - | - | 14.0 |
| 1949 | | - | - | - | - | - | - | - | 14.5 |
| 1950 | | - | - | - | - | - | - | - | 14.9 |
| 1951 | | - | - | - | - | - | - | - | 16.4 |
| 1952 | | - | - | - | - | - | - | - | 16.9 |
| 1953 | | - | - | - | - | - | - | - | 16.7 |
| 1954 | | - | - | - | - | - | - | - | 16.8 |
| 1955 | | - | - | - | - | - | - | - | 16.8 |
| 1956 | | - | - | - | - | - | - | - | 17.1 |
| 1957 | | - | - | - | - | - | - | - | 17.6 |
| 1958 | | - | - | - | - | - | - | - | 18.0 |
| 1959 | | - | - | - | - | - | - | - | 18.3 |
| 1960 | | - | - | - | - | - | - | - | 18.5 |
| 1961 | 100.0 | 15994 | 66736 | 7278 | 34271 | 151743 | 110193 | 111835 | 18.7 |
| 1962 | 100.8 | 15425 | 66183 | 6959 | 37697 | 153115 | 108458 | 110147 | 18.9 |
| 1963 | 99.0 | 14639 | 63733 | 6751 | 35236 | 148180 | 106191 | 108190 | 19.2 |
| 1964 | 100.6 | 14012 | 64455 | 6979 | 36332 | 145041 | 101731 | 104204 | 19.6 |
| 1965 | 105.3 | 13155 | 62420 | 7015 | 36908 | 139807 | 95884 | 99322 | 20.0 |
| 1966 | 112.8 | 11656 | 59069 | 6441 | 33258 | 134065 | 94367 | 95751 | 20.8 |
| 1967 | 116.3 | 10335 | 54489 | 5978 | 28969 | 120556 | 85609 | 86335 | 21.5 |
| 1968 | 120.2 | 9001 | 50595 | 5235 | 27562 | 111093 | 78296 | 78908 | 22.4 |
| 1969 | 121.2 | 8221 | 48841 | 5327 | 27945 | 108419 | 75148 | 75729 | 23.4 |
| 1970 | 124.4 | 7185 | 45651 | 5465 | 26090 | 95577 | 64022 | 64190 | 24.2 |
| 1971 | 126.5 | 6148 | 40990 | 5094 | 24404 | 89106 | 59608 | 59698 | 24.9 |
| 1972 | 135.5 | 5579 | 41036 | 4850 | 23591 | 103488 | 75048 | 75168 | 26.1 |
| 1973 | 145.3 | 5603 | 46097 | 5093 | 30083 | 154341 | 119165 | 119192 | 28.1 |
| 1974 | 163.4 | 5665 | 59366 | 5950 | 36774 | 206259 | 163536 | 163590 | 31.1 |
| 1975 | 174.4 | 5798 | 72094 | 7147 | 43485 | 200118 | 149486 | 149869 | 34.5 |
| 1976 | 185.5 | 5051 | 70221 | 7583 | 38738 | 159995 | 113674 | 113749 | 37.1 |
| 1977 | 186.7 | 4643 | 72753 | 9075 | 45663 | 206303 | 151564 | 151974 | 40.0 |
| 1978 | 181.1 | 4943 | 81776 | 11559 | 48105 | 267176 | 207513 | 207604 | 43.6 |
| 1979 | 194.6 | 5013 | 93926 | 13952 | 54883 | 391357 | 322522 | 322797 | 47.6 |
| 1980 | 202.1 | 5839 | 127869 | 18665 | 93742 | 696720 | 584313 | 588752 | 52.4 |
| 1981 | 209.6 | 6809 | 169138 | 27168 | 146172 | 693404 | 520064 | 518994 | 58.9 |
| 1982 | 217.1 | 7350 | 213190 | 40133 | 178743 | 783673 | 564798 | 566201 | 65.3 |
| 1983 | 228.9 | 7956 | 249912 | 49725 | 220832 | 960956 | 690399 | 693636 | 69.1 |
| 1984 | 230.4 | 8450 | 283791 | 57587 | 244347 | 964174 | 662240 | 660754 | 72.1 |
| 1985 | 231.1 | 7862 | 280661 | 64983 | 269467 | 969800 | 635351 | 635302 | 75.0 |
| 1986 | 239.3 | 8562 | 331166 | 72598 | 340459 | 1388382 | 975326 | 975348 | 78.1 |
| 1987 | 229.5 | 9757 | 388846 | 82271 | 421584 | 1815583 | 1311727 | 1307237 | 81.5 |
| 1988 | 235.7 | 12594 | 535109 | 97746 | 523882 | 2013663 | 1392035 | 1392955 | 84.8 |
| 1989 | 248.0 | 12631 | 588283 | 120501 | 530195 | 2079569 | 1428873 | 1425910 | 89.0 |
| 1990 | 261.7 | 11807 | 604836 | 135252 | 559464 | 2282757 | 1588041 | 1584276 | 93.3 |
| 1991 | 263.2 | 10869 | 594521 | 139954 | 546017 | 2228023 | 1542051 | 1543209 | 98.5 |
| 1992 | 267.9 | 9403 | 537836 | 127621 | 516638 | 1945637 | 1301378 | 1303025 | 100.0 |
| 1993 | 264.0 | 8810 | 501214 | 128468 | 511644 | 2092674 | 1452562 | 1442510 | 101.8 |
| 1994 | 262.9 | 9192 | 508842 | 135160 | 547641 | 2302648 | 1619846 | 1632732 | 102.0 |
| 1995 | 255.1 | 9849 | 559609 | 147718 | 587533 | 2374782 | 1639531 | 1654982 | 104.2 |
| 1996 | 266.6 | 10099 | 600824 | 171609 | 683757 | 2705706 | 1850341 | 1843392 | 105.9 |
| 1997 | 284.9 | 9621 | 639745 | 166931 | 744569 | 2484619 | 1573119 | 1563001 | 107.6 |
| 1998 | 290.2 | 8498 | 569101 | 143779 | 663804 | 2411155 | 1603573 | 1589561 | 108.6 |
| 1999 | 281.9 | 8215 | 551848 | 154359 | 656922 | 2124768 | 1313487 | 1304130 | 110.5 |
| 2000 | | - | - | - | - | - | - | - | 113.5 |
| 2001 | | - | - | - | - | - | - | - | 116.4 |

# 2. Gold Models

For the purpose of this analysis we make the simplifying assumption that gold supply each year is a given, meaning supply is perfectly price-inelastic. (This is not as restrictive as it sounds; producers have output targets, central banks have policies on gold sales, etc. These targets and policies are not very responsive to price in the short run. We have shown, for example, that mine production responds to price with a lage of 8-11 years.)




In Year 1 the market clears at $P_1$ and $Q_1$.

In Year 2 central banks sell gold. Since supply is inelastic, producers do not cut production meaningfully in Year 2. The gold price drops from $P_1$ to $P_2$ and producers lose revenue approximately equal to $Q_1$ x ($P_1$-$P_2$).

Over time however, producers will cut their production.

**The Model**

In any given year

$S = D$ (supply equals demand)

We theorize that

$D = f(P^*, F_1, \ldots F_n)$, (demand is a function of price and other factors)

Once we know the functional relationships of D we can estimate how much the gold price will have to fall in order for demand to absorb any central bank-induced increase in annual supply.

Assume

$$D = a_0 + a_1P^* + a_2F_1 + a_3F_3 + \ldots + a_nF_n$$

where

$a_i$ are constants to be estimated
D is gold demand
P* is the real price of gold
$F_i$ are factors of an income and currency nature
(i.e., non-price factors that affect demand)

We now use least square regression analysis to estimate the $a_i$'s.

**Model 1 (log form) - real gold price**

Demand = 11.99 - 0.40 (real gold price)
+1.11 (industrial output in the G7)
- 1.84 (index of the U.S. Dollar)
+0.43 (auto-regressive term)

$R^2$ = .9696
D.W. = 1.61
All coefficients are significant at the .001 level

**Model 2 (log form) - nominal gold price**

Demand = 9.79 - 0.34 (nominal gold price)
+0.74 (inflation index for the G7)
+0.92 (industrial output in the G7)
- 1.68 (index of U.S. Dollar)
+0.41 (auto-regressive term)

R2 = .9701
D.W. = 1.56
All coefficients, except the inflation coefficient, are significant at the .001 level. The inflation coefficient is significant at the .05 level.

For purposes of convenience we have used the coefficient for the nominal gold price, -.34, in our analysis of the impact of central bank gold sales and price.

# 3. A Model of Canadian Gold Production

To determine the lag structure in the response of production to price we specified two models, the first with real gold prices (inflation adjusted) and the second with nominal gold prices.

**Model 1 (log form) - real gold price**

Production = 7.72 + 0.11 (real gold price lagged 8 years)
+ 0.22 (real gold price lagged 9 years)
+ 0.12 (real gold price lagged 10 years)
+ 0.19 (real gold price lagged 11 years)
+ 0.93 (auto-regressive term)

$R^2$ = .9805
D.W. = 1.22
The coefficients of the gold price lagged 9 and 11 years are significant at the .005 level while the coefficient of the gold price lagged 8 and 10 years are significant at the .10 level.

**Model 2 (log form) - nominal gold price**

Production = 8.47 + 0.09 (real gold price lagged 8 years)
+ 0.20 (real gold price lagged 9 years)
+ 0.10 (real gold price lagged 10 years)
+ 0.15 (real gold price lagged 11 years)
+ 0.94 (auto-regressive term)

R2 = .9867
D.W. = 1.72
The coefficients of the gold price lagged 9 and 11 years are significant at the .005 level while the coefficient of the gold price lagged 8 and 10 years are significant at the .10 level.

For purposes of convenience we have used the coefficients of the nominal gold price in our analysis of the impact of price on production.

# 4. Estimates of Central Bank Gold Sales on Industry Variables

Tables 3 and 4 come from Table 7 below. Table 7 tells us how much industry variables change when gold prices and mine production change.

Table 7

**THE IMPACT OF PRICE AND PRODUCTION ON THE CANADIAN INDUSTRY**

| | a change of 10% in: | | | | | |
|---|---|---|---|---|---|---|
| | **PRODCA** | **PRODCA(-1)** | **GOCDN** | **GOCDN(-1)** | **R-SQ** | **D.W.** |
| changes by: | | | | | | |
| **WORKERS** | 6.9 | 1.6 * | 0.6 * | 3.4 | 0.980 | 1.443 |
| **WAGES** | 9.9 | 1.3 * | 1.7 | 5.1 | 0.999 | 2.007 |
| **TOTEMP** | 7.5 | 1.5 * | 0.8 | 3.2 | 0.981 | 1.563 |
| **TOTWS** | 10.8 | 0.8 * | 1.9 | 4.9 | 0.999 | 2.231 |
| **FUEL** | 11.4 | 0.2 * | 0.9 * | 3.6 | 0.997 | 1.428 |
| **MATERIAL** | 11.6 | 2.7 * | 3.1 | 5.5 | 0.996 | 1.899 |
| **RESCA** | 6.8 * | | 5.0 | | 0.739 | 1.363 |
| **MINEVA** | 9.3 | 1.9 * | 8.9 | 0.5 * | 0.998 | 1.834 |

| | a change of 10% in: | | | | | |
|---|---|---|---|---|---|---|
| | **GOCDN(-8)** | **GOCDN(-9)** | **GOCDN(-10)** | **GOCDN(-11)** | | |
| changes by: | | | | | | |
| **PRODCA** | 0.9 | 2.0 | 1.0 | 1.5 | 0.986 | 1.740 |

* : not significant at the 10% level
Results based on regression analysis with auto-regressive terms

Since central bank gold sales affect the gold price directly and gold production 8-11 years hence, we can calculate how central bank gold sales affect industry variables.

This is done in the following tables overleaf.

# Impact of All Central Bank Gold Sales on:

## *Canadian Gold Production*

**ALL CENTRAL BANK GOLD SALES**

| Date | Central Bank Gold Sales tonnes | CB Sales impact on price % | CB Sales impact on production % | Canada Gold Production tonnes | Total Impact on production ounces |
|---|---|---|---|---|---|
| 1980 | -230 | 6.52 | | 49 | |
| 1981 | -276 | 5.27 | | 47 | |
| 1982 | -85 | 1.73 | | 65 | |
| 1983 | 142 | -4.08 | | 74 | |
| 1984 | 85 | -1.64 | | 83 | |
| 1985 | -132 | 2.24 | | 88 | |
| 1986 | -145 | 2.27 | | 103 | |
| 1987 | 18 | -0.31 | | 117 | |
| 1988 | -155 | 2.03 | 0.60 | 136 | 26200 |
| 1989 | 434 | -5.99 | 1.80 | 160 | 90586 |
| 1990 | 198 | -2.67 | 1.90 | 169 | 101459 |
| 1991 | 100 | -1.23 | 1.47 | 176 | 82003 |
| 1992 | 622 | -8.27 | -0.02 | 161 | -1010 |
| 1993 | 468 | -6.46 | -0.29 | 153 | -14499 |
| 1994 | 130 | -1.53 | -0.11 | 147 | -5015 |
| 1995 | 167 | -1.79 | 0.42 | 152 | 20529 |
| 1996 | 279 | -3.16 | 0.69 | 166 | 36727 |
| 1997 | 326 | -3.11 | 0.15 | 171 | 8527 |
| 1998 | 380 | -4.02 | -1.29 | 166 | -69320 |
| 1999 | 478 | -4.95 | -0.98 | 158 | -49989 |
| 2000 | 489 | -5.13 | -2.17 | 154 | -109564 |
| 2001 | 504 | -5.74 | -2.78 | 157 | -144331 |
| 2002 | | | -2.48 | | |
| 2003 | | | -2.36 | **SUM: 1990-2001** | |
| 2004 | | | -1.76 | | |
| 2005 | | | -1.33 | | **-144481** |
| 2006 | | | -1.59 | | |
| 2007 | | | -2.05 | | |
| 2008 | | | -2.34 | | |
| 2009 | | | -2.67 | | |

* Gold production responds to the gold price with a lag of 8-11 years.

# Impact of All Central Bank Gold Sales on:

## *Production Workers Employed in the Gold Industry*

**ALL CENTRAL BANK GOLD SALES**

| Date | Central Bank Gold Sales tonnes | CB Sales impact on price % | CB Sales impact on production % | Price Impact on Workers % | Production Impact on Workers % | Total Impact on Workers % | Gold Production Workers number | Total Impact on Workers number |
|---|---|---|---|---|---|---|---|---|
| 1980 | -230 | 6.52 | | 0.41 | | 0.41 | 4781 | |
| 1981 | -276 | 5.27 | | 2.57 | | 2.57 | 5600 | |
| 1982 | -85 | 1.73 | | 1.92 | | 1.92 | 5809 | |
| 1983 | 142 | -4.08 | | 0.34 | | 0.34 | 6005 | |
| 1984 | 85 | -1.64 | | -1.51 | | -1.51 | 6773 | |
| 1985 | -132 | 2.24 | | -0.42 | | -0.42 | 6412 | |
| 1986 | -145 | 2.27 | | 0.92 | | 0.92 | 6598 | |
| 1987 | 18 | -0.31 | | 0.76 | | 0.76 | 7598 | |
| 1988 | -155 | 2.03 | 0.60 | 0.02 | 0.41 | 0.44 | 9813 | 43 |
| 1989 | 434 | -5.99 | 1.80 | 0.32 | 1.33 | 1.65 | 10130 | 165 |
| 1990 | 198 | -2.67 | 1.90 | -2.23 | 1.59 | -0.64 | 9591 | -62 |
| 1991 | 100 | -1.23 | 1.47 | -1.00 | 1.32 | 0.32 | 8563 | 27 |
| 1992 | 622 | -8.27 | -0.02 | -0.94 | 0.22 | -0.72 | 7166 | -52 |
| 1993 | 468 | -6.46 | -0.29 | -3.25 | -0.20 | -3.46 | 6795 | -243 |
| 1994 | 130 | -1.53 | -0.11 | -2.32 | -0.12 | -2.44 | 7033 | -176 |
| 1995 | 167 | -1.79 | 0.42 | -0.64 | 0.27 | -0.37 | 7492 | -28 |
| 1996 | 279 | -3.16 | 0.69 | -0.81 | 0.54 | -0.27 | 7595 | -21 |
| 1997 | 326 | -3.11 | 0.15 | -1.28 | 0.22 | -1.06 | 7207 | -78 |
| 1998 | 380 | -4.02 | -1.29 | -1.32 | -0.86 | -2.18 | 6374 | -142 |
| 1999 | 478 | -4.95 | -0.98 | -1.70 | -0.88 | -2.57 | 6279 | -166 |
| 2000 | 489 | -5.13 | -2.17 | -2.03 | -1.65 | -3.67 | | |
| 2001 | 504 | -5.74 | -2.78 | -2.13 | -2.26 | -4.38 | | |
| 2002 | | | -2.48 | | -2.15 | | | |
| 2003 | | | -2.36 | | -2.02 | | **SUM: 1990-1999** | |
| 2004 | | | -1.76 | | -1.58 | | | |
| 2005 | | | -1.33 | | -1.20 | | **74095** | **-939** |
| 2006 | | | -1.59 | | -1.30 | | | |
| 2007 | | | -2.05 | | -1.66 | | | |
| 2008 | | | -2.34 | | -1.94 | | | |
| 2009 | | | -2.67 | | -2.21 | | | |

# Impact of All Central Bank Gold Sales on:

## *Wages Paid in the Gold Mining Industry*

**ALL CENTRAL BANK GOLD SALES**

| Date | Central Bank Gold Sales tonnes | CB Sales impact on price % | CB Sales impact on production % | Price Impact on Wages % | Production Impact on Wages % | Total Impact on Wages % | Gold Production Wages 000$cdn | Total Impact on Wages 000$cdn | Impact on Wages 2001 $'s 000$cdn |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | -230 | 6.52 | | 1.09 | | 1.09 | 103293 | | |
| 1981 | -276 | 5.27 | | 4.18 | | 4.18 | 136782 | | |
| 1982 | -85 | 1.73 | | 2.96 | | 2.96 | 163619 | | |
| 1983 | 142 | -4.08 | | 0.19 | | 0.19 | 185431 | | |
| 1984 | 85 | -1.64 | | -2.34 | | -2.34 | 225635 | | |
| 1985 | -132 | 2.24 | | -0.45 | | -0.45 | 226230 | | |
| 1986 | -145 | 2.27 | | 1.52 | | 1.52 | 251446 | | |
| 1987 | 18 | -0.31 | | 1.10 | | 1.10 | 299136 | | |
| 1988 | -155 | 2.03 | 0.60 | 0.19 | 0.60 | 0.78 | 410600 | 3188 | 4376 |
| 1989 | 434 | -5.99 | 1.80 | 0.02 | 1.86 | 1.88 | 469884 | 8684 | 11358 |
| 1990 | 198 | -2.67 | 1.90 | -3.48 | 2.12 | -1.36 | 492259 | -6804 | -8489 |
| 1991 | 100 | -1.23 | 1.47 | -1.56 | 1.71 | 0.15 | 463010 | 697 | 824 |
| 1992 | 622 | -8.27 | -0.02 | -2.01 | 0.18 | -1.84 | 408532 | -7637 | -8889 |
| 1993 | 468 | -6.46 | -0.29 | -5.27 | -0.29 | -5.56 | 382991 | -22561 | -25797 |
| 1994 | 130 | -1.53 | -0.11 | -3.53 | -0.14 | -3.67 | 392175 | -14938 | -17047 |
| 1995 | 167 | -1.79 | 0.42 | -1.08 | 0.40 | -0.67 | 422911 | -2859 | -3194 |
| 1996 | 279 | -3.16 | 0.69 | -1.43 | 0.74 | -0.69 | 457762 | -3199 | -3516 |
| 1997 | 326 | -3.11 | 0.15 | -2.12 | 0.25 | -1.87 | 479347 | -9159 | -9908 |
| 1998 | 380 | -4.02 | -1.29 | -2.25 | -1.25 | -3.50 | 430039 | -15609 | -16730 |
| 1999 | 478 | -4.95 | -0.98 | -2.87 | -1.14 | -4.00 | 411956 | -17182 | -18099 |
| 2000 | 489 | -5.13 | -2.17 | -3.36 | -2.28 | -5.64 | | | |
| 2001 | 504 | -5.74 | -2.78 | -3.56 | -3.04 | -6.60 | | | |
| 2002 | | | -2.48 | | -2.82 | | | | |
| 2003 | | | -2.36 | | -2.66 | | **SUM: 1990-1999** | | |
| 2004 | | | -1.76 | | -2.05 | | | | |
| 2005 | | | -1.33 | | -1.55 | | **4340982** | **-99250** | **-110845** |
| 2006 | | | -1.59 | | -1.75 | | | | |
| 2007 | | | -2.05 | | -2.24 | | | | |
| 2008 | | | -2.34 | | -2.59 | | | | |
| 2009 | | | -2.67 | | -2.95 | | | | |

# Impact of All Central Bank Gold Sales on:

## *Total Employment in the Gold Industry*

**ALL CENTRAL BANK GOLD SALES**

| Date | Central Bank Gold Sales tonnes | CB Sales impact on price % | CB Sales impact on production % | Price Impact on Employment % | Production Impact on Employment % | Total Impact on Employment % | Gold Production Employment number | Total Impact on all Employment number |
|---|---|---|---|---|---|---|---|---|
| 1980 | -230 | 6.52 | | 0.55 | | 0.55 | 5839 | |
| 1981 | -276 | 5.27 | | 2.55 | | 2.55 | 6809 | |
| 1982 | -85 | 1.73 | | 1.85 | | 1.85 | 7350 | |
| 1983 | 142 | -4.08 | | 0.22 | | 0.22 | 7956 | |
| 1984 | 85 | -1.64 | | -1.46 | | -1.46 | 8450 | |
| 1985 | -132 | 2.24 | | -0.34 | | -0.34 | 7862 | |
| 1986 | -145 | 2.27 | | 0.92 | | 0.92 | 8562 | |
| 1987 | 18 | -0.31 | | 0.71 | | 0.71 | 9757 | |
| 1988 | -155 | 2.03 | 0.60 | 0.07 | 0.45 | 0.53 | 12594 | 66 |
| 1989 | 434 | -5.99 | 1.80 | 0.16 | 1.44 | 1.60 | 12631 | 199 |
| 1990 | 198 | -2.67 | 1.90 | -2.17 | 1.69 | -0.47 | 11807 | -56 |
| 1991 | 100 | -1.23 | 1.47 | -0.97 | 1.39 | 0.42 | 10869 | 45 |
| 1992 | 622 | -8.27 | -0.02 | -1.09 | 0.20 | -0.89 | 9403 | -85 |
| 1993 | 468 | -6.46 | -0.29 | -3.22 | -0.22 | -3.45 | 8810 | -314 |
| 1994 | 130 | -1.53 | -0.11 | -2.22 | -0.12 | -2.34 | 9192 | -221 |
| 1995 | 167 | -1.79 | 0.42 | -0.65 | 0.30 | -0.34 | 9849 | -34 |
| 1996 | 279 | -3.16 | 0.69 | -0.84 | 0.58 | -0.26 | 10099 | -26 |
| 1997 | 326 | -3.11 | 0.15 | -1.28 | 0.22 | -1.07 | 9621 | -104 |
| 1998 | 380 | -4.02 | -1.29 | -1.35 | -0.95 | -2.29 | 8498 | -199 |
| 1999 | 478 | -4.95 | -0.98 | -1.72 | -0.92 | -2.64 | 8215 | -223 |
| 2000 | 489 | -5.13 | -2.17 | -2.03 | -1.78 | -3.81 | | |
| 2001 | 504 | -5.74 | -2.78 | -2.14 | -2.41 | -4.56 | | |
| 2002 | | | -2.48 | | -2.28 | | | |
| 2003 | | | -2.36 | | -2.14 | | **SUM: 1990-1999** | |
| 2004 | | | -1.76 | | -1.67 | | | |
| 2005 | | | -1.33 | | -1.26 | | **96363** | **-1216** |
| 2006 | | | -1.59 | | -1.39 | | | |
| 2007 | | | -2.05 | | -1.78 | | | |
| 2008 | | | -2.34 | | -2.07 | | | |
| 2009 | | | -2.67 | | -2.35 | | | |

# Impact of All Central Bank Gold Sales on:

## *Total Wages and Salaries Paid in the Gold Mining Industry*

**ALL CENTRAL BANK GOLD SALES**

| Date | Central Bank Gold Sales tonnes | CB Sales impact on price % | CB Sales impact on production % | Price Impact on Sal.+Wage % | Production Impact on Sal.+Wage % | Total Impact on Sal.+Wage % | Total Sal.+Wage 000$cdn | Total Impact on Sal.+Wage 000$cdn | Total Impact on Sal.+Wage 2001 $'s 000$cdn |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | -230 | 6.52 | | 1.23 | | 1.23 | 127869 | | |
| 1981 | -276 | 5.27 | | 4.21 | | 4.21 | 169138 | | |
| 1982 | -85 | 1.73 | | 2.93 | | 2.93 | 213190 | | |
| 1983 | 142 | -4.08 | | 0.09 | | 0.09 | 249912 | | |
| 1984 | 85 | -1.64 | | -2.32 | | -2.32 | 283791 | | |
| 1985 | -132 | 2.24 | | -0.39 | | -0.39 | 280661 | | |
| 1986 | -145 | 2.27 | | 1.54 | | 1.54 | 331166 | | |
| 1987 | 18 | -0.31 | | 1.07 | | 1.07 | 388846 | | |
| 1988 | -155 | 2.03 | 0.60 | 0.23 | 0.65 | 0.88 | 535109 | 4660 | 6397 |
| 1989 | 434 | -5.99 | 1.80 | -0.12 | 1.98 | 1.86 | 588283 | 10751 | 14061 |
| 1990 | 198 | -2.67 | 1.90 | -3.46 | 2.19 | -1.27 | 604836 | -7810 | -9743 |
| 1991 | 100 | -1.23 | 1.47 | -1.55 | 1.74 | 0.19 | 594521 | 1109 | 1311 |
| 1992 | 622 | -8.27 | -0.02 | -2.16 | 0.10 | -2.06 | 537836 | -11329 | -13187 |
| 1993 | 468 | -6.46 | -0.29 | -5.30 | -0.32 | -5.62 | 501214 | -29829 | -34107 |
| 1994 | 130 | -1.53 | -0.11 | -3.48 | -0.14 | -3.62 | 508842 | -19093 | -21788 |
| 1995 | 167 | -1.79 | 0.42 | -1.09 | 0.45 | -0.65 | 559609 | -3646 | -4073 |
| 1996 | 279 | -3.16 | 0.69 | -1.48 | 0.78 | -0.70 | 600824 | -4224 | -4643 |
| 1997 | 326 | -3.11 | 0.15 | -2.14 | 0.22 | -1.92 | 639745 | -12533 | -13558 |
| 1998 | 380 | -4.02 | -1.29 | -2.29 | -1.37 | -3.66 | 569101 | -21642 | -23197 |
| 1999 | 478 | -4.95 | -0.98 | -2.92 | -1.15 | -4.07 | 551848 | -23426 | -24677 |
| 2000 | 489 | -5.13 | -2.17 | -3.41 | -2.41 | -5.82 | | | |
| 2001 | 504 | -5.74 | -2.78 | -3.61 | -3.17 | -6.78 | | | |
| 2002 | | | -2.48 | | -2.89 | | | | |
| 2003 | | | -2.36 | | -2.74 | | **SUM: 1990-1999** | | |
| 2004 | | | -1.76 | | -2.08 | | | | |
| 2005 | | | -1.33 | | -1.58 | | **5668375** | **-132423** | **-147662** |
| 2006 | | | -1.59 | | -1.82 | | | | |
| 2007 | | | -2.05 | | -2.34 | | | | |
| 2008 | | | -2.34 | | -2.69 | | | | |
| 2009 | | | -2.67 | | -3.06 | | | | |

# Impact of All Central Bank Gold Sales on:

## *Materials and Supplies Purchased by the Gold Industry*

**ALL CENTRAL BANK GOLD SALES**

| Date | Central Bank Gold Sales tonnes | CB Sales impact on price % | CB Sales impact on production % | Price Impact on Mat&Sup % | Production Impact on Mat&Sup % | Total Impact on Mat&Sup % | Material and Supplies 000$cdn | Total Impact on Mat&Sup 000$cdn | Impact on Mat&Sup 2001 $'s 000$cdn |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | -230 | 6.52 | | 2.01 | | 2.01 | 93742 | | |
| 1981 | -276 | 5.27 | | 5.23 | | 5.23 | 146172 | | |
| 1982 | -85 | 1.73 | | 3.44 | | 3.44 | 178743 | | |
| 1983 | 142 | -4.08 | | -0.31 | | -0.31 | 220832 | | |
| 1984 | 85 | -1.64 | | -2.76 | | -2.76 | 244347 | | |
| 1985 | -132 | 2.24 | | -0.21 | | -0.21 | 269467 | | |
| 1986 | -145 | 2.27 | | 1.94 | | 1.94 | 340459 | | |
| 1987 | 18 | -0.31 | | 1.16 | | 1.16 | 421584 | | |
| 1988 | -155 | 2.03 | 0.60 | 0.46 | 0.70 | 1.16 | 523882 | 6007 | 8246 |
| 1989 | 434 | -5.99 | 1.80 | -0.73 | 2.26 | 1.53 | 530195 | 7987 | 10446 |
| 1990 | 198 | -2.67 | 1.90 | -4.13 | 2.70 | -1.43 | 559464 | -8129 | -10141 |
| 1991 | 100 | -1.23 | 1.47 | -1.86 | 2.23 | 0.38 | 546017 | 2059 | 2433 |
| 1992 | 622 | -8.27 | -0.02 | -3.23 | 0.38 | -2.85 | 516638 | -15174 | -17662 |
| 1993 | 468 | -6.46 | -0.29 | -6.56 | -0.35 | -6.91 | 511644 | -37967 | -43412 |
| 1994 | 130 | -1.53 | -0.11 | -4.04 | -0.20 | -4.24 | 547641 | -24261 | -27686 |
| 1995 | 167 | -1.79 | 0.42 | -1.40 | 0.46 | -0.94 | 587533 | -5549 | -6198 |
| 1996 | 279 | -3.16 | 0.69 | -1.96 | 0.92 | -1.04 | 683757 | -7196 | -7909 |
| 1997 | 326 | -3.11 | 0.15 | -2.70 | 0.37 | -2.33 | 744569 | -17796 | -19252 |
| 1998 | 380 | -4.02 | -1.29 | -2.96 | -1.45 | -4.41 | 663804 | -30656 | -32858 |
| 1999 | 478 | -4.95 | -0.98 | -3.75 | -1.49 | -5.24 | 656922 | -36309 | -38248 |
| 2000 | 489 | -5.13 | -2.17 | -4.32 | -2.79 | -7.11 | | | |
| 2001 | 504 | -5.74 | -2.78 | -4.61 | -3.83 | -8.43 | | | |
| 2002 | | | -2.48 | | -3.65 | | | | |
| 2003 | | | -2.36 | | -3.42 | | **SUM: 1990-1999** | | |
| 2004 | | | -1.76 | | -2.69 | | | | |
| 2005 | | | -1.33 | | -2.03 | | **6017989** | **-180977** | **-200933** |
| 2006 | | | -1.59 | | -2.21 | | | | |
| 2007 | | | -2.05 | | -2.82 | | | | |
| 2008 | | | -2.34 | | -3.29 | | | | |
| 2009 | | | -2.67 | | -3.74 | | | | |

# Impact of All Central Bank Gold Sales on:

## *Gold Mining Valued Added in Canada*

**ALL CENTRAL BANK GOLD SALES**

| Date | Central Bank Gold Sales tonnes | CB Sales impact on price % | CB Sales impact on production % | Price Impact on Mine VA % | Production Impact on Mine VA % | Total Impact on Mine VA % | Gold Mine VA 000$cdn | Total Gold Mine VA Lost 000$cdn | Impact on Value Added 2001 $'s 000$cdn |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | -230 | 6.52 | | 5.80 | | 5.80 | 584313 | 33889 | 75281 |
| 1981 | -276 | 5.27 | | 5.03 | | 5.03 | 520064 | 26184 | 51746 |
| 1982 | -85 | 1.73 | | 1.82 | | 1.82 | 564798 | 10257 | 18283 |
| 1983 | 142 | -4.08 | | -3.54 | | -3.54 | 690399 | -24419 | -41135 |
| 1984 | 85 | -1.64 | | -1.67 | | -1.67 | 662240 | -11090 | -17905 |
| 1985 | -132 | 2.24 | | 1.91 | | 1.91 | 635351 | 12139 | 18839 |
| 1986 | -145 | 2.27 | | 2.14 | | 2.14 | 975326 | 20890 | 31135 |
| 1987 | 18 | -0.31 | | -0.16 | | -0.16 | 1311727 | -2046 | -2922 |
| 1988 | -155 | 2.03 | 0.60 | 1.79 | 0.56 | 2.36 | 1392035 | 32807 | 45032 |
| 1989 | 434 | -5.99 | 1.80 | -5.23 | 1.79 | -3.43 | 1428873 | -49047 | -64146 |
| 1990 | 198 | -2.67 | 1.90 | -2.69 | 2.12 | -0.58 | 1588041 | -9137 | -11400 |
| 1991 | 100 | -1.23 | 1.47 | -1.23 | 1.74 | 0.51 | 1542051 | 7844 | 9269 |
| 1992 | 622 | -8.27 | -0.02 | -7.43 | 0.27 | -7.16 | 1301378 | -93134 | -108409 |
| 1993 | 468 | -6.46 | -0.29 | -6.18 | -0.28 | -6.46 | 1452562 | -93842 | -107301 |
| 1994 | 130 | -1.53 | -0.11 | -1.70 | -0.16 | -1.86 | 1619846 | -30108 | -34359 |
| 1995 | 167 | -1.79 | 0.42 | -1.67 | 0.37 | -1.30 | 1639531 | -21288 | -23780 |
| 1996 | 279 | -3.16 | 0.69 | -2.90 | 0.73 | -2.18 | 1850341 | -40274 | -44268 |
| 1997 | 326 | -3.11 | 0.15 | -2.94 | 0.28 | -2.66 | 1573119 | -41795 | -45214 |
| 1998 | 380 | -4.02 | -1.29 | -3.74 | -1.17 | -4.91 | 1603573 | -78750 | -84406 |
| 1999 | 478 | -4.95 | -0.98 | -4.61 | -1.16 | -5.78 | 1313487 | -75858 | -79908 |
| 2000 | 489 | -5.13 | -2.17 | -4.82 | -2.21 | -7.03 | | | |
| 2001 | 504 | -5.74 | -2.78 | -5.38 | -3.01 | -8.39 | | | |
| 2002 | | | -2.48 | | -2.85 | | | | |
| 2003 | | | -2.36 | | -2.68 | | **SUM: 1990-1999** | | |
| 2004 | | | -1.76 | | -2.10 | | | | |
| 2005 | | | -1.33 | | -1.58 | | **15483929** | **-476344** | **-529774** |
| 2006 | | | -1.59 | | -1.74 | | | | |
| 2007 | | | -2.05 | | -2.22 | | | | |
| 2008 | | | -2.34 | | -2.58 | | | | |
| 2009 | | | -2.67 | | -2.94 | | | | |

# Impact of Bank of Canada Gold Sales on:

## *Canadian Gold Production*

**BANK OF CANADA GOLD SALES**

| Date | Bank of Canada Gold Sales tonnes | BoC Sales impact on price % | BoC Sales impact on production % | Canada Gold Production tonnes | Total Impact on production ounces |
|---|---|---|---|---|---|
| 1980 | 37.2 | -1.36 | | 49 | |
| 1981 | 16.1 | -0.37 | | 47 | |
| 1982 | 6.2 | -0.13 | | 65 | |
| 1983 | 2.9 | -0.07 | | 74 | |
| 1984 | 1.0 | -0.02 | | 83 | |
| 1985 | 0.9 | -0.02 | | 88 | |
| 1986 | 11.9 | -0.20 | | 103 | |
| 1987 | 37.5 | -0.66 | | 117 | |
| 1988 | 42.9 | -0.61 | -0.13 | 136 | -5488 |
| 1989 | 28.5 | -0.34 | -0.31 | 160 | -15768 |
| 1990 | 41.6 | -0.53 | -0.23 | 169 | -12419 |
| 1991 | 56.0 | -0.68 | -0.27 | 176 | -15321 |
| 1992 | 93.9 | -1.03 | -0.08 | 161 | -4391 |
| 1993 | 121.0 | -1.46 | -0.03 | 153 | -1615 |
| 1994 | 67.4 | -0.78 | -0.03 | 147 | -1652 |
| 1995 | 14.6 | -0.15 | -0.11 | 152 | -5187 |
| 1996 | 10.2 | -0.11 | -0.21 | 166 | -11379 |
| 1997 | 0.0 | 0.00 | -0.25 | 171 | -13902 |
| 1998 | 18.7 | -0.18 | -0.28 | 166 | -14767 |
| 1999 | 21.2 | -0.19 | -0.29 | 158 | -14895 |
| 2000 | 19.3 | -0.18 | -0.34 | 154 | -16681 |
| 2001 | 4.1 | -0.04 | -0.49 | 157 | -24921 |
| 2002 | | | -0.57 | | |
| 2003 | | | -0.47 | **Sum: 1990-2001** | |
| 2004 | | | -0.33 | | |
| 2005 | | | -0.15 | | **-137131** |
| 2006 | | | -0.05 | | |
| 2007 | | | -0.07 | | |
| 2008 | | | -0.07 | | |
| 2009 | | | -0.09 | | |

# Impact of Bank of Canada Gold Sales on:

## *Production Workers Employed in the Gold Industry*

**BANK OF CANADA GOLD SALES**

| Date | Bank of Canada Gold Sales tonnes | BoC Sales impact on price % | BoC Sales impact on production % | Price Impact on Workers % | Production Impact on Workers % | Total Impact on Workers % | Gold Production Workers number | Total Impact on Workers number |
|---|---|---|---|---|---|---|---|---|
| 1980 | 37.2 | -1.36 | | -0.09 | | -0.09 | 4781 | |
| 1981 | 16.1 | -0.37 | | -0.49 | | -0.49 | 5600 | |
| 1982 | 6.2 | -0.13 | | -0.14 | | -0.14 | 5809 | |
| 1983 | 2.9 | -0.07 | | -0.05 | | -0.05 | 6005 | |
| 1984 | 1.0 | -0.02 | | -0.03 | | -0.03 | 6773 | |
| 1985 | 0.9 | -0.02 | | -0.01 | | -0.01 | 6412 | |
| 1986 | 11.9 | -0.20 | | -0.02 | | -0.02 | 6598 | |
| 1987 | 37.5 | -0.66 | | -0.11 | | -0.11 | 7598 | |
| 1988 | 42.9 | -0.61 | -0.13 | -0.27 | -0.09 | -0.35 | 9813 | -35 |
| 1989 | 28.5 | -0.34 | -0.31 | -0.23 | -0.23 | -0.46 | 10130 | -47 |
| 1990 | 41.6 | -0.53 | -0.23 | -0.15 | -0.21 | -0.35 | 9591 | -34 |
| 1991 | 56.0 | -0.68 | -0.27 | -0.22 | -0.22 | -0.45 | 8563 | -38 |
| 1992 | 93.9 | -1.03 | -0.08 | -0.30 | -0.10 | -0.40 | 7166 | -29 |
| 1993 | 121.0 | -1.46 | -0.03 | -0.45 | -0.04 | -0.48 | 6795 | -33 |
| 1994 | 67.4 | -0.78 | -0.03 | -0.55 | -0.03 | -0.58 | 7033 | -41 |
| 1995 | 14.6 | -0.15 | -0.11 | -0.28 | -0.08 | -0.36 | 7492 | -27 |
| 1996 | 10.2 | -0.11 | -0.21 | -0.06 | -0.16 | -0.22 | 7595 | -17 |
| 1997 | 0.0 | 0.00 | -0.25 | -0.04 | -0.21 | -0.24 | 7207 | -18 |
| 1998 | 18.7 | -0.18 | -0.28 | -0.01 | -0.23 | -0.24 | 6374 | -15 |
| 1999 | 21.2 | -0.19 | -0.29 | -0.07 | -0.25 | -0.32 | 6279 | -20 |
| 2000 | 19.3 | -0.18 | -0.34 | -0.08 | -0.28 | -0.36 | | |
| 2001 | 4.1 | -0.04 | -0.49 | -0.06 | -0.39 | -0.45 | | |
| 2002 | | | -0.57 | | -0.47 | | | |
| 2003 | | | -0.47 | | -0.42 | | **SUM: 1990-1999** | |
| 2004 | | | -0.33 | | -0.31 | | | |
| 2005 | | | -0.15 | | -0.16 | | **74095** | **-272** |
| 2006 | | | -0.05 | | -0.06 | | | |
| 2007 | | | -0.07 | | -0.06 | | | |
| 2008 | | | -0.07 | | -0.06 | | | |
| 2009 | | | -0.09 | | -0.07 | | | |

# Impact of Bank of Canada Gold Sales on:

## *Wages Paid in the Gold Mining Industry*

**BANK OF CANADA GOLD SALES**

| Date | Bank of Canada Gold Sales tonnes | BoC Sales impact on price % | BoC Sales impact on production % | Price Impact on Wages % | Production Impact on Wages % | Total Impact on Wages % | Gold Production Wages 000$cdn | Total Impact on Wages 000$cdn | Impact on Wages 2001 $'s 000$cdn |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | 37.2 | -1.36 | | -0.23 | | -0.23 | 103293 | | |
| 1981 | 16.1 | -0.37 | | -0.75 | | -0.75 | 136782 | | |
| 1982 | 6.2 | -0.13 | | -0.21 | | -0.21 | 163619 | | |
| 1983 | 2.9 | -0.07 | | -0.08 | | -0.08 | 185431 | | |
| 1984 | 1.0 | -0.02 | | -0.04 | | -0.04 | 225635 | | |
| 1985 | 0.9 | -0.02 | | -0.01 | | -0.01 | 226230 | | |
| 1986 | 11.9 | -0.20 | | -0.04 | | -0.04 | 251446 | | |
| 1987 | 37.5 | -0.66 | | -0.21 | | -0.21 | 299136 | | |
| 1988 | 42.9 | -0.61 | -0.13 | -0.44 | -0.12 | -0.56 | 410600 | -2312 | -3173 |
| 1989 | 28.5 | -0.34 | -0.31 | -0.36 | -0.32 | -0.68 | 469884 | -3240 | -4238 |
| 1990 | 41.6 | -0.53 | -0.23 | -0.26 | -0.27 | -0.53 | 492259 | -2600 | -3244 |
| 1991 | 56.0 | -0.68 | -0.27 | -0.38 | -0.30 | -0.68 | 463010 | -3164 | -3739 |
| 1992 | 93.9 | -1.03 | -0.08 | -0.52 | -0.12 | -0.64 | 408532 | -2614 | -3043 |
| 1993 | 121.0 | -1.46 | -0.03 | -0.77 | -0.04 | -0.81 | 382991 | -3140 | -3590 |
| 1994 | 67.4 | -0.78 | -0.03 | -0.87 | -0.04 | -0.91 | 392175 | -3602 | -4110 |
| 1995 | 14.6 | -0.15 | -0.11 | -0.42 | -0.11 | -0.53 | 422911 | -2245 | -2508 |
| 1996 | 10.2 | -0.11 | -0.21 | -0.09 | -0.22 | -0.32 | 457762 | -1458 | -1602 |
| 1997 | 0.0 | 0.00 | -0.25 | -0.05 | -0.28 | -0.33 | 479347 | -1591 | -1721 |
| 1998 | 18.7 | -0.18 | -0.28 | -0.03 | -0.31 | -0.34 | 430039 | -1454 | -1559 |
| 1999 | 21.2 | -0.19 | -0.29 | -0.12 | -0.33 | -0.45 | 411956 | -1858 | -1957 |
| 2000 | 19.3 | -0.18 | -0.34 | -0.13 | -0.37 | -0.50 | | | |
| 2001 | 4.1 | -0.04 | -0.49 | -0.10 | -0.53 | -0.63 | | | |
| 2002 | | | -0.57 | | -0.63 | | | | |
| 2003 | | | -0.47 | | -0.55 | | **SUM: 1990-1999** | | |
| 2004 | | | -0.33 | | -0.39 | | | | |
| 2005 | | | -0.15 | | -0.19 | | **4340982** | **-23726** | **-27073** |
| 2006 | | | -0.05 | | -0.07 | | | | |
| 2007 | | | -0.07 | | -0.07 | | | | |
| 2008 | | | -0.07 | | -0.08 | | | | |
| 2009 | | | -0.09 | | -0.09 | | | | |

# Impact of Bank of Canada Gold Sales on:

## *Total Employment in the Gold Industry*

**BANK OF CANADA GOLD SALES**

| Date | Bank of Canada Gold Sales tonnes | BoC Sales impact on price % | BoC Sales impact on production % | Price Impact on Employment % | Production Impact on Employment % | Total Impact on Employment % | Gold Production Employment number | Total Impact on all Employment number |
|---|---|---|---|---|---|---|---|---|
| 1980 | 37.2 | -1.36 | | -0.11 | | -0.11 | 5839 | |
| 1981 | 16.1 | -0.37 | | -0.47 | | -0.47 | 6809 | |
| 1982 | 6.2 | -0.13 | | -0.13 | | -0.13 | 7350 | |
| 1983 | 2.9 | -0.07 | | -0.05 | | -0.05 | 7956 | |
| 1984 | 1.0 | -0.02 | | -0.03 | | -0.03 | 8450 | |
| 1985 | 0.9 | -0.02 | | -0.01 | | -0.01 | 7862 | |
| 1986 | 11.9 | -0.20 | | -0.02 | | -0.02 | 8562 | |
| 1987 | 37.5 | -0.66 | | -0.12 | | -0.12 | 9757 | |
| 1988 | 42.9 | -0.61 | -0.13 | -0.26 | -0.09 | -0.36 | 12594 | -45 |
| 1989 | 28.5 | -0.34 | -0.31 | -0.23 | -0.25 | -0.48 | 12631 | -60 |
| 1990 | 41.6 | -0.53 | -0.23 | -0.15 | -0.22 | -0.37 | 11807 | -44 |
| 1991 | 56.0 | -0.68 | -0.27 | -0.23 | -0.24 | -0.47 | 10869 | -51 |
| 1992 | 93.9 | -1.03 | -0.08 | -0.31 | -0.10 | -0.41 | 9403 | -39 |
| 1993 | 121.0 | -1.46 | -0.03 | -0.46 | -0.04 | -0.50 | 8810 | -44 |
| 1994 | 67.4 | -0.78 | -0.03 | -0.54 | -0.03 | -0.57 | 9192 | -53 |
| 1995 | 14.6 | -0.15 | -0.11 | -0.26 | -0.09 | -0.35 | 9849 | -35 |
| 1996 | 10.2 | -0.11 | -0.21 | -0.06 | -0.18 | -0.23 | 10099 | -24 |
| 1997 | 0.0 | 0.00 | -0.25 | -0.03 | -0.22 | -0.26 | 9621 | -25 |
| 1998 | 18.7 | -0.18 | -0.28 | -0.01 | -0.25 | -0.26 | 8498 | -22 |
| 1999 | 21.2 | -0.19 | -0.29 | -0.07 | -0.26 | -0.34 | 8215 | -28 |
| 2000 | 19.3 | -0.18 | -0.34 | -0.08 | -0.30 | -0.37 | | |
| 2001 | 4.1 | -0.04 | -0.49 | -0.06 | -0.42 | -0.48 | | |
| 2002 | | | -0.57 | | -0.50 | | | |
| 2003 | | | -0.47 | | -0.44 | | **SUM: 1990-1999** | |
| 2004 | | | -0.33 | | -0.32 | | | |
| 2005 | | | -0.15 | | -0.16 | | **96363** | **-362** |
| 2006 | | | -0.05 | | -0.06 | | | |
| 2007 | | | -0.07 | | -0.06 | | | |
| 2008 | | | -0.07 | | -0.07 | | | |
| 2009 | | | -0.09 | | -0.08 | | | |

# Impact of Bank of Canada Gold Sales on:

## *Total Wages and Salaries Paid in the Gold Mining Industry*

**BANK OF CANADA GOLD SALES**

| Date | Bank of Canada Gold Sales tonnes | BoC Sales impact on price % | BoC Sales impact on production % | Price Impact on Sal.+Wage % | Production Impact on Sal.+Wage % | Total Impact on Sal.+Wage % | Total Sal.+Wage 000$cdn | Total Impact on Sal.+Wage 000$cdn | Total Impact on Sal.+Wage 2001 $'s 000$cdn |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | 37.2 | -1.36 | | -0.25 | | -0.25 | 127869 | | |
| 1981 | 16.1 | -0.37 | | -0.74 | | -0.74 | 169138 | | |
| 1982 | 6.2 | -0.13 | | -0.21 | | -0.21 | 213190 | | |
| 1983 | 2.9 | -0.07 | | -0.08 | | -0.08 | 249912 | | |
| 1984 | 1.0 | -0.02 | | -0.04 | | -0.04 | 283791 | | |
| 1985 | 0.9 | -0.02 | | -0.01 | | -0.01 | 280661 | | |
| 1986 | 11.9 | -0.20 | | -0.05 | | -0.05 | 331166 | | |
| 1987 | 37.5 | -0.66 | | -0.22 | | -0.22 | 388846 | | |
| 1988 | 42.9 | -0.61 | -0.13 | -0.44 | -0.13 | -0.57 | 535109 | -3094 | -4247 |
| 1989 | 28.5 | -0.34 | -0.31 | -0.36 | -0.34 | -0.70 | 588283 | -4172 | -5456 |
| 1990 | 41.6 | -0.53 | -0.23 | -0.27 | -0.27 | -0.54 | 604836 | -3257 | -4064 |
| 1991 | 56.0 | -0.68 | -0.27 | -0.39 | -0.31 | -0.70 | 594521 | -4175 | -4934 |
| 1992 | 93.9 | -1.03 | -0.08 | -0.53 | -0.11 | -0.64 | 537836 | -3474 | -4044 |
| 1993 | 121.0 | -1.46 | -0.03 | -0.79 | -0.04 | -0.83 | 501214 | -4187 | -4787 |
| 1994 | 67.4 | -0.78 | -0.03 | -0.87 | -0.04 | -0.91 | 508842 | -4670 | -5329 |
| 1995 | 14.6 | -0.15 | -0.11 | -0.41 | -0.12 | -0.53 | 559609 | -2976 | -3325 |
| 1996 | 10.2 | -0.11 | -0.21 | -0.09 | -0.24 | -0.33 | 600824 | -1992 | -2190 |
| 1997 | 0.0 | 0.00 | -0.25 | -0.05 | -0.29 | -0.34 | 639745 | -2183 | -2362 |
| 1998 | 18.7 | -0.18 | -0.28 | -0.03 | -0.32 | -0.35 | 569101 | -2006 | -2151 |
| 1999 | 21.2 | -0.19 | -0.29 | -0.12 | -0.34 | -0.46 | 551848 | -2559 | -2696 |
| 2000 | 19.3 | -0.18 | -0.34 | -0.13 | -0.39 | -0.51 | | | |
| 2001 | 4.1 | -0.04 | -0.49 | -0.10 | -0.56 | -0.65 | | | |
| 2002 | | | -0.57 | | -0.66 | | | | |
| 2003 | | | -0.47 | | -0.56 | | **SUM: 1990-1999** | | |
| 2004 | | | -0.33 | | -0.40 | | | | |
| 2005 | | | -0.15 | | -0.19 | | **5668375** | **-31480** | **-35880** |
| 2006 | | | -0.05 | | -0.07 | | | | |
| 2007 | | | -0.07 | | -0.08 | | | | |
| 2008 | | | -0.07 | | -0.08 | | | | |
| 2009 | | | -0.09 | | -0.10 | | | | |

# Impact of Bank of Canada Gold Sales on:

## *Materials and Supplies Purchased by the Gold Industry*

**BANK OF CANADA GOLD SALES**

| Date | Bank of Canada Gold Sales tonnes | BoC Sales impact on price % | BoC Sales impact on production % | Price Impact on Mat&Sup % | Production Impact on Mat&Sup % | Total Impact on Mat&Sup % | Material and Supplies 000$cdn | Total Impact on Mat&Sup 000$cdn | Impact on Mat&Sup 2001 $'s 000$cdn |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | 37.2 | -1.36 | | -0.42 | | -0.42 | 93742 | | |
| 1981 | 16.1 | -0.37 | | -0.86 | | -0.86 | 146172 | | |
| 1982 | 6.2 | -0.13 | | -0.24 | | -0.24 | 178743 | | |
| 1983 | 2.9 | -0.07 | | -0.10 | | -0.10 | 220832 | | |
| 1984 | 1.0 | -0.02 | | -0.05 | | -0.05 | 244347 | | |
| 1985 | 0.9 | -0.02 | | -0.02 | | -0.02 | 269467 | | |
| 1986 | 11.9 | -0.20 | | -0.07 | | -0.07 | 340459 | | |
| 1987 | 37.5 | -0.66 | | -0.31 | | -0.31 | 421584 | | |
| 1988 | 42.9 | -0.61 | -0.13 | -0.55 | -0.15 | -0.70 | 523882 | -3682 | -5054 |
| 1989 | 28.5 | -0.34 | -0.31 | -0.44 | -0.39 | -0.83 | 530195 | -4446 | -5814 |
| 1990 | 41.6 | -0.53 | -0.23 | -0.35 | -0.35 | -0.70 | 559464 | -3933 | -4907 |
| 1991 | 56.0 | -0.68 | -0.27 | -0.50 | -0.38 | -0.88 | 546017 | -4834 | -5713 |
| 1992 | 93.9 | -1.03 | -0.08 | -0.69 | -0.17 | -0.87 | 516638 | -4512 | -5252 |
| 1993 | 121.0 | -1.46 | -0.03 | -1.02 | -0.06 | -1.08 | 511644 | -5611 | -6415 |
| 1994 | 67.4 | -0.78 | -0.03 | -1.05 | -0.05 | -1.10 | 547641 | -6078 | -6936 |
| 1995 | 14.6 | -0.15 | -0.11 | -0.48 | -0.13 | -0.61 | 587533 | -3596 | -4017 |
| 1996 | 10.2 | -0.11 | -0.21 | -0.12 | -0.28 | -0.39 | 683757 | -2684 | -2951 |
| 1997 | 0.0 | 0.00 | -0.25 | -0.06 | -0.35 | -0.41 | 744569 | -3060 | -3310 |
| 1998 | 18.7 | -0.18 | -0.28 | -0.05 | -0.39 | -0.45 | 663804 | -2972 | -3185 |
| 1999 | 21.2 | -0.19 | -0.29 | -0.16 | -0.42 | -0.57 | 656922 | -3794 | -3997 |
| 2000 | 19.3 | -0.18 | -0.34 | -0.16 | -0.47 | -0.63 | | | |
| 2001 | 4.1 | -0.04 | -0.49 | -0.11 | -0.66 | -0.77 | | | |
| 2002 | | | -0.57 | | -0.80 | | | | |
| 2003 | | | -0.47 | | -0.71 | | **SUM: 1990-1999** | | |
| 2004 | | | -0.33 | | -0.52 | | | | |
| 2005 | | | -0.15 | | -0.27 | | **6017989** | **-41074** | **-46683** |
| 2006 | | | -0.05 | | -0.10 | | | | |
| 2007 | | | -0.07 | | -0.09 | | | | |
| 2008 | | | -0.07 | | -0.10 | | | | |
| 2009 | | | -0.09 | | -0.12 | | | | |

# Impact of Bank of Canada Gold Sales on:

## *Gold Mining Valued Added in Canada*

**BANK OF CANADA GOLD SALES**

| Date | Bank of Canada Gold Sales tonnes | BoC Sales impact on price % | BoC Sales impact on production % | Price Impact on Mine VA % | Production Impact on Mine VA % | Total Impact on Mine VA % | Gold Mine VA 000$cdn | Total Gold Mine VA Lost 000$cdn | Impact on Value Added 2001 $'s 000$cdn |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | 37.2 | -1.36 | | -1.21 | | -1.21 | 584313 | -7048 | -15655 |
| 1981 | 16.1 | -0.37 | | -0.40 | | -0.40 | 520064 | -2076 | -4102 |
| 1982 | 6.2 | -0.13 | | -0.14 | | -0.14 | 564798 | -781 | -1392 |
| 1983 | 2.9 | -0.07 | | -0.07 | | -0.07 | 690399 | -505 | -851 |
| 1984 | 1.0 | -0.02 | | -0.02 | | -0.02 | 662240 | -139 | -224 |
| 1985 | 0.9 | -0.02 | | -0.02 | | -0.02 | 635351 | -104 | -162 |
| 1986 | 11.9 | -0.20 | | -0.18 | | -0.18 | 975326 | -1754 | -2614 |
| 1987 | 37.5 | -0.66 | | -0.60 | | -0.60 | 1311727 | -7831 | -11184 |
| 1988 | 42.9 | -0.61 | -0.13 | -0.58 | -0.12 | -0.69 | 1392035 | -9654 | -13251 |
| 1989 | 28.5 | -0.34 | -0.31 | -0.33 | -0.31 | -0.64 | 1428873 | -9182 | -12009 |
| 1990 | 41.6 | -0.53 | -0.23 | -0.49 | -0.27 | -0.76 | 1588041 | -12058 | -15043 |
| 1991 | 56.0 | -0.68 | -0.27 | -0.63 | -0.30 | -0.93 | 1542051 | -14287 | -16884 |
| 1992 | 93.9 | -1.03 | -0.08 | -0.96 | -0.13 | -1.09 | 1301378 | -14161 | -16483 |
| 1993 | 121.0 | -1.46 | -0.03 | -1.36 | -0.05 | -1.40 | 1452562 | -20392 | -23316 |
| 1994 | 67.4 | -0.78 | -0.03 | -0.77 | -0.04 | -0.81 | 1619846 | -13087 | -14934 |
| 1995 | 14.6 | -0.15 | -0.11 | -0.17 | -0.11 | -0.28 | 1639531 | -4579 | -5116 |
| 1996 | 10.2 | -0.11 | -0.21 | -0.10 | -0.22 | -0.32 | 1850341 | -5926 | -6514 |
| 1997 | 0.0 | 0.00 | -0.25 | -0.01 | -0.28 | -0.28 | 1573119 | -4427 | -4789 |
| 1998 | 18.7 | -0.18 | -0.28 | -0.16 | -0.31 | -0.46 | 1603573 | -7453 | -7989 |
| 1999 | 21.2 | -0.19 | -0.29 | -0.18 | -0.33 | -0.51 | 1313487 | -6667 | -7023 |
| 2000 | 19.3 | -0.18 | -0.34 | -0.17 | -0.37 | -0.54 | | | |
| 2001 | 4.1 | -0.04 | -0.49 | -0.05 | -0.52 | -0.57 | | | |
| 2002 | | | -0.57 | | -0.63 | | | | |
| 2003 | | | -0.47 | | -0.55 | | **SUM: 1990-1999** | | |
| 2004 | | | -0.33 | | -0.40 | | | | |
| 2005 | | | -0.15 | | -0.21 | | **15483929** | **-103037** | **-118091** |
| 2006 | | | -0.05 | | -0.08 | | | | |
| 2007 | | | -0.07 | | -0.07 | | | | |
| 2008 | | | -0.07 | | -0.08 | | | | |
| 2009 | | | -0.09 | | -0.09 | | | | |

# 5. Computer Printout of Models

## Gold Demand Models - variables

**OURS -** Gold demand in tonnes

**GO** - Gold price, US$ per ounce, average for year

**WPG7N** - An inflation index for the G-7 countries

**GO/WPG7N** - A proxy for the "real" price of gold

**IPG7** - An industrial output index for the G-7 countries

**EFXR0** - An index of the U.S. Dollar's value

## Model of Canadian Gold Production - variables

**PRODCA** - Gold production in Canada

**GOCDN(-*i*)** - Gold price in Canadian Dollars, lagged *i* years

**RGOCDN(-*i*)** - The real (inflation adjusted) gold price in Canadian Dollars, lagged *i* years

**AR(1)** is an autoregressive term

"**L**" in front of the variable denotes log

## Gold Demand Models *(models in LOG form!)*

```
============================================================
Dependent Variable: LOURS
Method: Least Squares
Date: 02/06/02   Time: 15:13
Sample: 1981:1 2001:4
Included observations: 84
Convergence achieved after 8 iterations
============================================================
     Variable      CoefficientStd. Errort-Statistic  Prob.
============================================================
         C           11.99135   2.357731   5.085969   0.0000
   LOG(GO/WPG7N)    -0.401025   0.109375  -3.666509   0.0004
       LIPG7         1.114188   0.212186   5.250996   0.0000
      LEFXR0        -1.841383   0.272549  -6.756158   0.0000
       AR(1)         0.427544   0.082738   5.167473   0.0000
============================================================
R-squared            0.969616    Mean dependent var 7.862273
Adjusted R-squared   0.968078    S.D. dependent var 0.326176
S.E. of regression   0.058278    Akaike info criter-2.789522
Sum squared resid    0.268305    Schwarz criterion -2.644831
Log likelihood       122.1599    F-statistic        630.2618
Durbin-Watson stat   1.610558    Prob(F-statistic)  0.000000
============================================================
Inverted AR Roots         .43
============================================================

============================================================
Dependent Variable: LOURS
Method: Least Squares
Date: 02/06/02   Time: 15:13
Sample: 1981:1 2001:4
Included observations: 84
Convergence achieved after 7 iterations
============================================================
     Variable      CoefficientStd. Errort-Statistic  Prob.
============================================================
         C           9.794514   3.110379   3.148978   0.0023
        LGO         -0.338479   0.122178  -2.770372   0.0070
      LWPG7N         0.743155   0.330698   2.247229   0.0275
       LIPG7         0.917180   0.272944   3.360326   0.0012
      LEFXR0        -1.676855   0.310519  -5.400162   0.0000
       AR(1)         0.408456   0.087475   4.669409   0.0000
============================================================
R-squared            0.970066    Mean dependent var 7.862273
Adjusted R-squared   0.968147    S.D. dependent var 0.326176
S.E. of regression   0.058214    Akaike info criter-2.780644
Sum squared resid    0.264329    Schwarz criterion -2.607015
Log likelihood       122.7871    F-statistic        505.5509
Durbin-Watson stat   1.558291    Prob(F-statistic)  0.000000
============================================================
Inverted AR Roots         .41
============================================================
```

## Model of Canadian Gold Production *(models in LOG form!)*

```
============================================================
Dependent Variable: LPRODCA
Method: Least Squares
Date: 02/06/02   Time: 14:13
Sample: 1961 2001
Included observations: 41
Convergence achieved after 10 iterations
============================================================
     Variable      CoefficientStd. Errort-Statistic  Prob.
============================================================
         C           8.473752   0.621191   13.64113   0.0000
    LGOCDN(-8)       0.093990   0.049584   1.895571   0.0663
    LGOCDN(-9)       0.200756   0.054947   3.653656   0.0008
    LGOCDN(-10)      0.102547   0.055027   1.863572   0.0708
    LGOCDN(-11)      0.146602   0.049500   2.961678   0.0055
       AR(1)         0.940715   0.025133   37.42917   0.0000
============================================================
R-squared            0.986693    Mean dependent var 11.49600
Adjusted R-squared   0.984792    S.D. dependent var 0.446146
S.E. of regression   0.055019    Akaike info criter-2.827812
Sum squared resid    0.105949    Schwarz criterion -2.577045
Log likelihood       63.97014    F-statistic        519.0358
Durbin-Watson stat   1.720673    Prob(F-statistic)  0.000000
============================================================
Inverted AR Roots         .94
============================================================
============================================================
Dependent Variable: LPRODCA
Method: Least Squares
Date: 02/06/02   Time: 14:13
Sample: 1961 2001
Included observations: 41
Convergence achieved after 18 iterations
============================================================
     Variable      CoefficientStd. Errort-Statistic  Prob.
============================================================
         C           7.723699   0.697993   11.06558   0.0000
    LRGOCDN(-8)      0.110367   0.061677   1.789452   0.0822
    LRGOCDN(-9)      0.216546   0.066674   3.247814   0.0026
   LRGOCDN(-10)      0.115284   0.066676   1.729006   0.0926
   LRGOCDN(-11)      0.192124   0.061594   3.119179   0.0036
       AR(1)         0.934282   0.040904   22.84105   0.0000
============================================================
R-squared            0.980533    Mean dependent var 11.49600
Adjusted R-squared   0.977752    S.D. dependent var 0.446146
S.E. of regression   0.066546    Akaike info criter-2.447376
Sum squared resid    0.154995    Schwarz criterion -2.196610
Log likelihood       56.17121    F-statistic        352.5789
Durbin-Watson stat   1.224720    Prob(F-statistic)  0.000000
============================================================
Inverted AR Roots         .93
============================================================
```