



THE PRECIOUS METALS INDUSTRY IN SWITZERLAND'S ECONOMY

Olivier Cadot
Dyai Conde

December 2013

Unil
UNIL | Université de Lausanne
HEC Lausanne

CRÉA Institut de
macroéconomie
appliquée

Contents

Executive summary.....3

1 Introduction.....5

2 Understanding the global gold market.....5

 2.1 A highly dynamic, high-potential export market.....5

 2.2 with strong governance mechanisms 11

3 Precious metals refining in Switzerland’s economy 12

 3.1 The economics of precious-metal refining 12

 3.2 Precious-metal refining’s contribution to the Swiss economy 13

4 Switzerland’s recipe for success : A unique industrial cluster 15

5 Conclusions..... 17

References..... 18

Executive summary

Precious-metal refining is a Swiss success story, drawing on the country's competitive strengths and contributing back to its wealth. Its success rests on a regulatory framework that has grown increasingly effective in recent years and put Swiss producers in the position of standard-setters of the profession and global referees in the international gold market. It also rests on underlying competitive assets including tight management, innovation, a skilled workforce, and linkages to downstream sectors including watch-making, jewelry, and banking.

The precious-metal refining sector contributes to Switzerland's national wealth, generating over 1'500 direct jobs and another 1'000 indirectly. These are "quality jobs", leveraging skills and paying wages substantially above the manufacturing average. The industry also contributes directly CHF 29 million in corporate income tax and, indirectly, another 10 million through employee income taxes.

Switzerland's position in the global gold market is strategic as gold has strong growth potential worldwide. It is a "superior good" whose demand rises more than proportionately with consumer wealth; at the same time, it serves as store of value during periods of uncertainty, making it less vulnerable to economic downturns. It has dynamic demand in two of the world's largest and fastest-growing emerging markets, India and China, which together account for close to 60% of world gold demand (although they account for less than a fifth of global GDP). This positive market orientation makes Switzerland's position portent of future growth and job creation.

The gold market has also substantially improved its self-regulation over the years, and some of Switzerland's refiners have been leaders in the sector's emerging global governance, thanks to their analytical capabilities and reliance on a national regulatory system that is itself global best practice. Switzerland's regulatory system dates back from the 1880s and has evolved in steps throughout the XXth century. Its strength derives from original features like the "*essayeur juré*" profession—a body of quality inspectors who are legally responsible for their assessments—and its oversight of refineries.

Together with watch-making and banking, precious-metals refining forms a cluster of activities that have carved for themselves a global leadership position. The success of Switzerland's banking and watch-making industries is well known. The success of its precious-metal refiners and their critical contribution to the cluster's overall competitiveness is less known. In the watch industry, where Swiss-made products dominate the market's upper segment, precious metals, according to a recent market study, have the most dynamic demand. The availability of domestically-refined gold enhances the ability of domestic producers to claim the Swiss-made label and to respond to demand swings.

Similarly, the ability of banks to put on the market, with their stamp on it, Swiss-made gold bars of guaranteed quality and title contributes to the attractiveness of their gold-trading activities, which can account for up to 10% of forex profits. Without local refiners, they would have to procure gold from foreign producers, forsaking the competitive advantage conferred by Switzerland's precious-metals legal framework.

The creation of successful clusters of export-oriented activities, positioned on dynamic and high-quality segments of global markets, is the objective of every industrial-policy plan in every country. Very few such plans succeed. Clusters emerge only progressively and may take decades to reach maturity, beyond the typical horizon of policymakers. Moreover, the recipe for success is elusive as

industry clusters react only weakly to standard industrial-policy instruments like tax incentives, technical assistance, or export promotion. If clusters are difficult to create, they are easy to destroy. Because of their complexity, they are vulnerable to entropy and can collapse if one of their pillars weakens. The place of precious-metal refining in Switzerland's "gold cluster" is critical in this regard.

1 Introduction

Precious-metal refining is a Swiss success story, drawing on the country's competitive strengths and contributing back to its wealth. Its success rests on a regulatory framework that has grown increasingly effective in recent years and put Swiss producers in the position of standard-setters of the profession and global referees in the international gold market. It also rests on underlying competitive assets including tight management, innovation, a skilled workforce, and linkages to downstream sectors including watch-making, jewelry, and banking.

The precious-metal refining sector contributes to Switzerland's national wealth, generating over 1'500 direct jobs and another 1'000 indirectly. These are "quality jobs", leveraging skills and paying wages substantially above the manufacturing average. The industry also contributes directly CHF 29 million in corporate income tax and, indirectly, another 10 million through employee income taxes.

Together with watch-making and banking, precious-metals refining forms a cluster of activities that have carved for themselves a global leadership position. The success of Switzerland's banking and watch-making industries is well known. The success of its precious-metal refiners and their critical contribution to the cluster's overall competitiveness is less known. In the watch industry, where Swiss-made products dominate the market's upper segment, precious metals, according to a recent market study, have the most dynamic demand. The availability of domestically-refined gold enhances the ability of domestic producers to claim the Swiss-made label and to respond to demand swings.

The combination of a tight, well-designed regulatory framework, close contacts between key operators all along the value chain, and strong within-firm competitive assets (management and skills) is the archetype of a successful industrial cluster. However, as in all complex systems, entropy can quickly set in. Ambitious players in Asia are on the rise, with their eyes set on worldwide dominance in the long run.

This report, written at the request of the *Association Suisse des fabricants et commerçants de métaux précieux*, provides a quantitative overview of the key elements that make Switzerland's precious-metal industry competitive, while leaving aside the issues of traceability and ethical buying. While critical to the industry's future, these issues are complex and fall outside of the scope of economic analysis *stricto sensu*, deserving a full factual analysis on their own. Section 2 provides an overview of the global gold market in terms of demand structure and governance mechanisms. Section 3 analyses the economics of precious-metal refining and the sector's contribution to the Swiss economy in terms of employment and value added. Section 4 discusses the sector's success and the potential threats that it faces. Section 5 concludes.

2 Understanding the global gold market

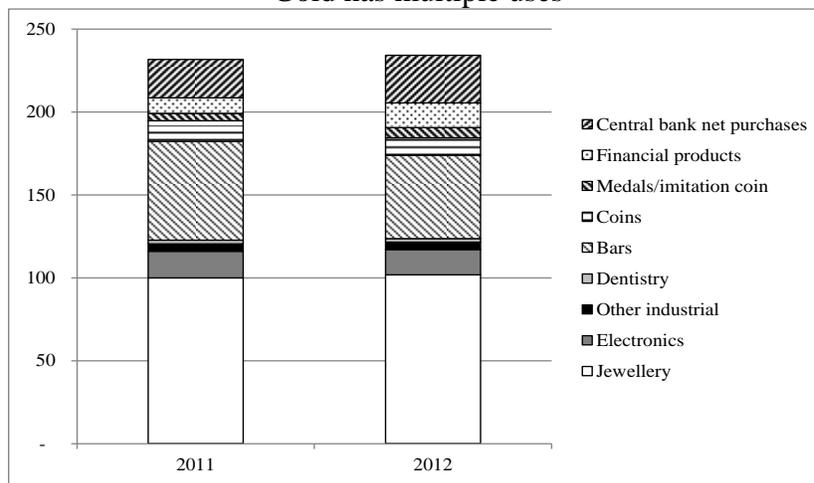
2.1 A highly dynamic, high-potential export market

The world market for precious metals, and particularly gold, is a high-opportunity one, where Switzerland has managed to build a strong position. Gold heavily dominates the world market for precious metals, with a worldwide demand that stood at US\$234 billion in 2012, against 32.6

billion for silver.¹ Accordingly, in what follows we will focus on the gold market and mention silver only in passing.

The market for gold stands out from other commodity markets for the metal’s use in three highly different types of usage : (i) store of value (savings and official reserves, which together accounted for 47.2% of gold demand in 2012), (ii) jewelry (another 43.5%), and (iii) industrial uses (9.3%).² Figure 1 shows that central banks are powerful players in the market, accounting for 12% of world purchases in 2012. As a result, the market depends on the interplay of very complex forces that have to do with shifting individual tastes and macroeconomic conditions. Moreover, industrial uses are expanding as the use of gold nanoparticles in a number of high-tech sectors is attracting growing scientific attention (Box 1).

Figure 1
Gold has multiple uses



Note : Gold demand, in billion US dollars

Source : World Gold Council.

It also stands out for the large share of recycling in supply. When prices are perceived by the market to be low, as is currently the case (see below **Error! Reference source not found.**), the share of recycled material in total supply stands at about a third (U.S.\$ 85 billion in 2012, or 36% of total supply). When prices are high, it can climb to as much as 80% of supply, reflecting gold’s high unit value (U.S.\$1’283 per ounce at the time of writing).³ According to industry players, on average, recycled material accounts for over half of total supply. Very few commodities have such an efficient product cycle. While the efficiency in gold usage derives primarily from its high unit value rather than environmental concerns, it remains that it is a highly efficiently used mineral product.

¹ World Gold Council (2012) for gold ; World Silver Survey 2013 for silver.

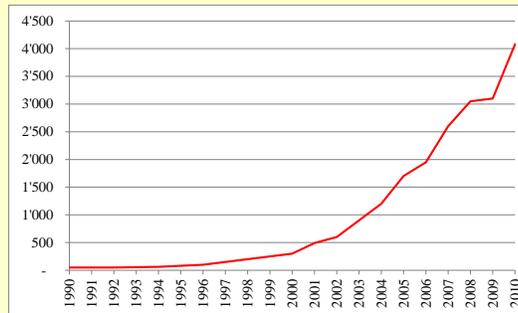
² By contrast, industrial uses represented in 2012 44% of the world demand for silver and jewelry only 18%.

³ The proportion of recycled material in world supply is slightly higher for gold than for silver (24% in 2012). It also varies with the price cycle.

Box 1 Gold's rising industrial uses

Documented non-jewelry uses of gold go back to ancient times, as the Etruscans used gold wire to hold “substitute teeth” in the VIIth century BC. The Romans also used gold to color glassware to make it reflect light in a special way. Today, gold's industrial uses, while still secondary in value, have increasing potential in high technologies (Figure 2).

Figure 2
The rise in gold-related technology patents



Source: Adapted from World Gold Council (2011).

According to recent medical research, gold nanoparticles can be combined with biological molecules to create a “mesh” that dissipates or changes color when exposed to enzymes that indicate pathologies including AIDS. Other medical uses of gold nanoparticles include, *inter alia*, combining them with antibiotics to reinforce their longevity and antimicrobial power, or with silver nanoparticle to impregnate dressings to treat wounds.

In industry, gold-based catalysts have recently been shown to be clean and cost-effective substitutes to heavily polluting mercury-based catalysts used in the production of vinyl acetate monomer (VAM), an ingredient entering the manufacture of resins, paints and adhesives. They can also be used to reduce the cost of catalytic converters in automobiles. Most interestingly, gold/platinum nanoparticles have recently been shown in MIT research⁴ to increase the efficiency of lithium-air batteries.

In utilities, gold nanoparticles can be used to detect and remove pesticides, organic residues and heavy metals from drinking water. A new gold-palladium nanoparticle catalyst is also expected to break up trichloroethylene, a pollutant, into harmless constituents.

Source: World Gold Council (2011)

Worldwide gold demand is heavily skewed toward the most dynamic Asian economies. Because of the large share of jewelry and savings in gold uses, the worldwide distribution of demand reflects differences in individual and societal tastes rather than just market size. For instance, Table 1 shows that China represented in 2012 close to a third of total gold demand, although its GDP was only 12% of the world economy (15.6% if evaluated at purchasing-power

⁴ Lu et al. (2010).

parity).⁵ India accounted for almost another quarter, against only 2.7% of the world economy (6% at PPP).

Table 1
Worldwide gold demand is dominated by Asian countries

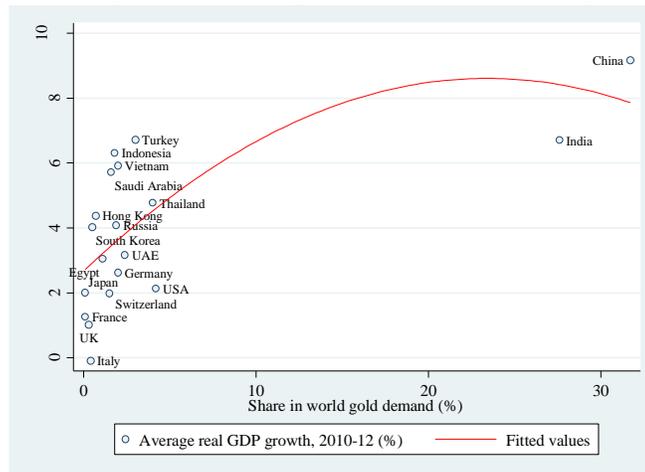
	Share in gold demand (%)			Share in world GDP (%)	
	Jewellery	Bars & coins	Total	current US\$	Purchasing-power parity
China	33.5	29.0	31.7	12.0	15.6
India	28.9	25.7	27.6	2.7	6.0
Thailand	0.3	9.5	4.0	0.5	0.8
USA	3.4	5.3	4.2	22.9	19.9
Turkey	3.0	2.9	3.0	1.2	1.6
UAE	3.5	0.7	2.4		
Germany		5.0	2.0	5.0	4.3
Vietnam	0.8	3.8	2.0	0.2	0.4
Russia	3.1		1.9	2.9	4.1
Indonesia	2.0	1.5	1.8	1.3	1.5
Switzerland		3.8	1.5	0.9	0.6

Source : World Gold Council and World Bank, World Development Indicators.

Overall economic dynamism correlates strongly with the demand for gold, as illustrated in Figure 3. The horizontal axis measures each country’s share in world gold demand (jewelry, bars and coins together) while the vertical one shows average real GDP growth over the last three years. The largest two gold-market players, China and India, are among the world’s highly dynamic economies. Other countries are bunched toward the left of the diagram, but some of the big players in gold (Thailand, Vietnam, Indonesia, Turkey) are also among the world’s most dynamic economies. Thus, strong export positions in the market for gold translate mechanically into sustained demand growth. Few products, and especially few commodities, have that strong “growth-driver” property for their exporters.

⁵ Evaluating national GDPs at purchasing-power parity (PPP) means that similar goods and services are valued at the same prices in the calculation of GDP. For instance, if a restaurant meal costs \$5 in India and \$30 in the US, it contributes six times less to GDP in India than in the US even though the service is the same, thus biasing the comparison. When calculating India’s GDP at PPP, the restaurant meal is valued at its US price, making India’s GDP more comparable.

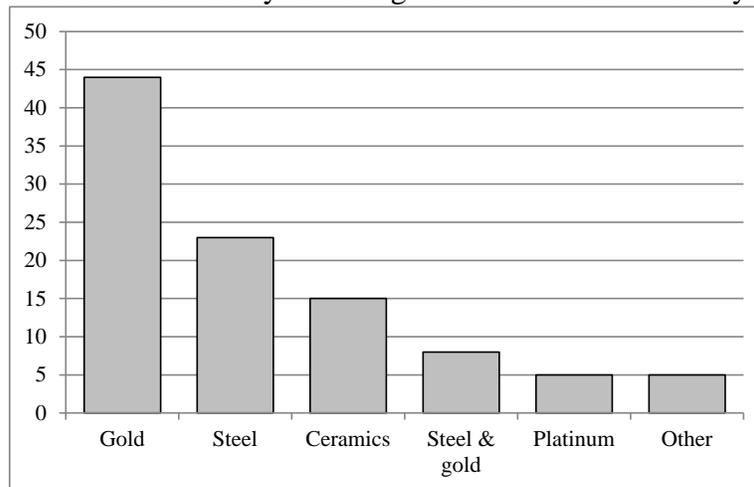
Figure 3
Economic dynamism and gold demand correlate positively



Notes: The red curve is obtained by fitting a polynomial OLS regression.
Source: Authors calculations using World Gold Council; World Bank, World Economic Indicators.

The gold market’s dynamism is reflected in one of its key downstream sectors—the watch industry. A 2012 Deloitte survey of the Swiss watch industry (Figure 4) showed that gold stands out as the prime source of expected growth for watch-industry players, far ahead of other segments.

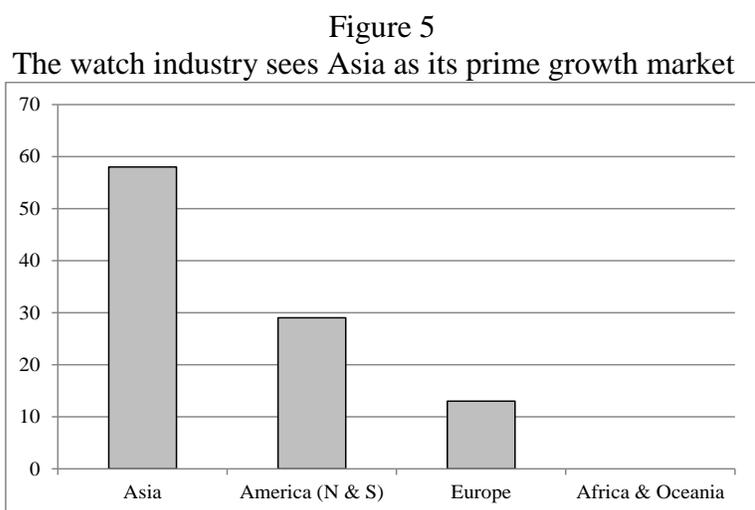
Figure 4
Gold is the most dynamic segment of the watch industry



Note: The height of each bar measures the percent of respondents indicating the given material (gold, steel, etc.) as the market’s most dynamic segment. Respondents could name only one segment, so bar heights add up to 100.
Source: Deloitte (2012), graph. 28.

Watch-industry players also expect Asia to be the most dynamic market (Figure 5). Thus, the watch and gold industries face similarly “Asia-centered” growth prospects. To some extent, designating Asia as the prime source of growth is not something special—all sectors face a similar distribution of future world growth. What makes the “gold-watch-jewelry” cluster special, in this

regard, is two key features: (i) the heavy dominance of Asia not just in terms of future growth prospects, but also in terms of *today's* sales volumes (to recall—over 60% of worldwide gold sales go to just five Asian countries: China, India, Thailand, Vietnam and Indonesia); and (ii) Switzerland's super-strong position as the world's premier gold supplier. Industry sources indicate that over half of the world's refined gold originates from Switzerland's refineries, which also hold 70% of worldwide refining capacity, as one of them has substantial excess capacity. Thus, Switzerland is in a strong position to capture future demand increases when they materialize.



Note: The height of each bar measures the percent of respondents indicating the given continent as the most dynamic market. Respondents could name only one segment, so bar heights add up to 100.

Source: Adapted from Deloitte (2012), graph. 16.

In sum, Switzerland has managed to carve for itself a very strong position as number-one supplier in a market that is highly dynamic and likely to remain so. Growth in the world's key gold markets—China, India, Thailand, Vietnam and Indonesia—may be subject to macroeconomic fluctuations, but with improved policy environments it is likely to remain strong in the long term.⁶ Moreover, gold products are, in economic jargon, “superior goods”—goods whose share in budgets rises with income—making growth in gold demand a multiple of overall growth.

However, competition is also on the rise. In industry, no positions are acquired forever. Other ambitious suppliers, including the UAE (Dubai) and Singapore, are strategically positioning themselves as regional refining and trading hubs. Both have the resources and vision to get there. For instance, International Enterprise, Singapore's export-promotion agency, states as its objective to raise the city-state's share in the global precious-metals market from about 2% currently to 10-15% within less than a decade, making it Asia's gold-trading hub. As part of that plan, in October 2012 the government of Singapore exempted investment-grade precious metals from the 7% goods & services tax (a sales tax playing roughly the role of a VAT). Singapore hopes to outcompete rivals Dubai and Hong-Kong by offering, in addition to first-rate infrastructure and air connectivity, political and economic stability, low crime rates, and Swiss-style governance. Until recently, it suffered from a lack of refining capacities; but Switzerland's Metalor announced in November 2012

⁶ However, see the IMF's cautious analysis of India's growth prospects in a recent macroeconomic report at <http://www.imf.org/external/pubs/ft/scr/2013/cr1337.pdf>.

that it was building a gold refinery and manufacturing plant for gold-based products, with support from Singapore’s Economic Development Board.

Thus, while Switzerland has established a stronghold in precious-metal refining, a key growth industry worldwide, it cannot rest on its laurels as ambitious new players are appearing in the landscape. In order to understand better the sources of Switzerland’s competitive advantage, we now turn to the market’s governance mechanisms.

2.2 with improving governance mechanisms

The world gold market has set up unique governance mechanisms. Its global governing body is the London Bullion Metal Association (LBMA), formed in 1987 to adapt the market’s institutions to a changing environment.⁷ Until the 1980s, the global gold market was dominated by the five members of the London Gold Fixing and regulated largely by the Bank of England. The end of Bretton Woods and the macroeconomic turbulences of the 1980s triggered the first massive rise in gold prices (to \$850 per ounce), attracting new players and globalizing the London market. New rules were required for the new environment.⁸

One of the key elements of the global gold market’s governance is the “Good Delivery List” (GDL) of prime refiners. There are currently 65 refiners worldwide on the GDL, up from 50 at the turn of the XXIst century. Accession is subject to a multidimensional test covering quality capabilities (based on three independent examinations of products submitted), analysis capabilities, financial capabilities, and due diligence. About three companies apply every year, around half of which succeed. After major reforms were introduced in the LBMA’s governance in 2001, the LBMA today controls the accession process, and companies on the GDL must prove their analytical capabilities at least every three years under a system called “proactive monitoring” that involves product inspections and factory visits.⁹ This positive certification system may look like a barrier to entry—and it might be to some extent—but it is primarily designed to limit the scope for moral hazard, a critical issue in gold refining. Given gold’s high unit value, very small discrepancies in title can make a big difference.¹⁰ Since 2012, refiners on the GDL must also adhere to the LBMA’s Responsible Gold Program, which largely follows OECD guidelines.¹¹

The second important layer of governance is the profession’s referees and dispute-settlement system. As part of the LBMA’s 2001 reform, it created a referee panel of five companies chosen from the GDL. Referee companies provide expert judgment in disputes involving product title; they also run tests for GDL applicants. Eight GDL companies chose to embark on the long process to obtain referee status. They had to demonstrate analytical skills in order to produce standards above any suspicion; they also had, of course, to be very reputable companies. After a two-year process involving the testing of 1’300 samples per company and several hundred tests, by applicant

⁷ Prior to the formation of the LBMA, the market was regulated by the London Silver Fixing, founded in 1897, and by the five-member London Gold Fixing, founded in 1919.

⁸ Besides changes in fundamentals, the market was also affected by major regulatory changes including the UK’s 1986 Financial Services Act.

⁹ On this, see Jodry (2013).

¹⁰ The 2001 LBMA reforms were introduced partly in response to widespread suspicions that some bars marked as containing 99.9% gold were actually containing less (Jodry, 2013).

¹¹ See http://www.lbma.org.uk/pages/index.cfm?page_id=137&title=responsible_gold.

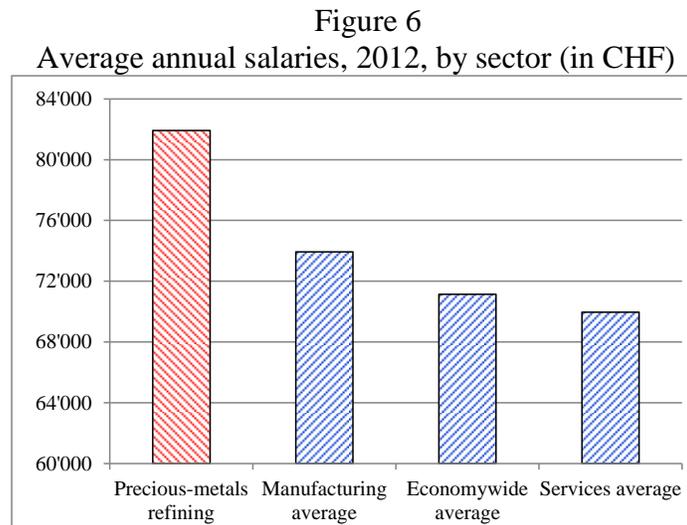
companies, of anonymous samples submitted by other applicant companies,¹² five were chosen: Argor Heraeus SA, Metalor Technologies SA, and PAMP SA, all three from Switzerland; Rand, from South Africa, and Tanaka Kikinzoku from Japan (Jodry, 2013).

The overwhelming share of Swiss companies in the profession’s referees speaks to the high level of trust these companies enjoy. The Swiss companies’ high standing has been and remains a key competitive asset. As we will see in Section 4 below, Swiss companies not only have very strong technical capabilities; they also derive benefits from a strict regulatory system that goes beyond LBMA governance rules to eliminate moral hazard.

3 Precious metals refining in Switzerland’s economy

3.1 The economics of precious-metal refining

Precious-metal refining is a capital-intensive industry characterized by high wages. The value of inventories and capital (increasingly sophisticated machinery) is high relatively to labor costs, muting the effect of labor-cost differentials. In Switzerland’s precious-metal refining, full-time equivalent jobs number 1’567 in total, a relatively small number. However, because value-added per worker is high (CHF 200’000),¹³ those are relatively high-paying jobs (over CHF 80’000 per full-time equivalent employee including charges; see Figure 6) which generate substantial purchasing power and well-being for the households concerned.



Source: OFS, industry

It requires extreme managerial attention to detail. Precious-metal refining involves a complete value chain from raw material (either recycled or imported, as discussed in Section 2) to

¹² Determining the precious metal content of an alloy is called “assaying”. It is performed either by direct measurement of the alloy’s precious-metal content (“fire assay” for gold) or indirectly, using so-called “instrumental methods” (usually spectrographic analysis) measuring impurity levels and estimating the precious metal content as the difference between total mass and impurities. See <http://www.lbma.org.uk>.

¹³ However, value added is only about 1% of the material’s cost because of the latter’s high unit value.

intermediate products like watch cases. Processes include melting, cold rolling, manufacturing, and testing. Some of the activities (melting and cold-rolling) are somewhat similar to those in a steel mill; however, the scale is much smaller and the economics is different. In precious-metal refining, what matters is not economies of scale but rather “economies of speed” as the raw material is so expensive that holding it has a very large opportunity cost (gold inventories cost about 2’000 francs per ton per day, much more than fixed capital amortization). For the same reason, the process is also very sensitive to waste, requiring ultra-careful handling and clean facilities. These are conditions that can be more easily met in Switzerland than in some of the big gold-market countries.

3.2 The precious-metal industry’s contribution to the Swiss economy

Switzerland’s precious-metal industry contributes substantially to employment, value added, and tax revenue. As shown in Table 2, in 2012 it employed over 1’500 full-time equivalent workers, of which about two thirds were Swiss residents (most of the sector is located in the Ticino, close to Italy’s border, and in the Neuchâtel canton). This injected into the Swiss economy close to CHF 90 million in annual purchasing power. The industry also generated CHF421 million in turnover (11% of the metallurgy sector), of which 313 million (18% of the metallurgy sector) in value added, and over 80 million in intermediate purchases, including high-tech capital equipment and services. Finally, it contributed close to 40 million in tax revenue, over three quarters of which in the form of corporate income taxes.

Table 2
Direct impact of the precious-metal refining sector on Switzerland’s economy, 2012

<u>Employment (Full time equivalents)</u>	
Total	1'567
Swiss residents a/	1'092
<u>Salaries distributed (million CHF)</u>	
Total	128.4
To Swiss residents	89.4
<u>Intermediate consumptions (million CHF)</u>	
Total	108.8
To Swiss suppliers	82.4
<u>Taxes (million CHF)</u>	
Income taxes	10.7
Corporate income taxes	28.7

Notes:

a/ Estimated from payroll data

Source: Authors calculations from industry data

Table 3
Indirect (second-round) effects

	Via intermediate consumptions	Via employees consumption
Employment a/	373	241
Wages b/	28.6	19.0
Value added b/	58.9	30.9
Consumption b/	-	52.9

Notes:

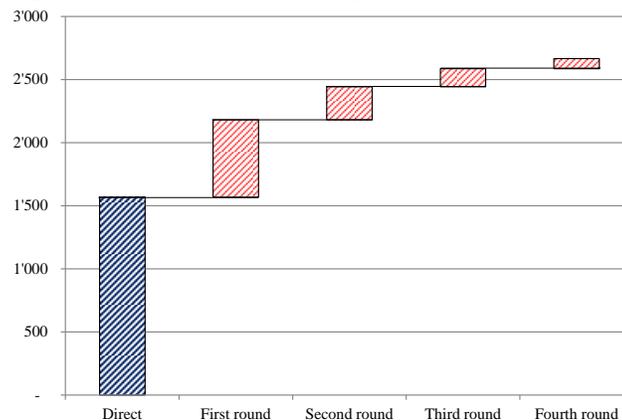
a/ in numbers

b/ in million francs

Source: Industry, OFS

The industry's impact does not stop at direct effects: it also generates indirect (multiplier) effects throughout the economy. The purchasing power generated by intermediate consumptions and the expenditures of employees' households itself generates directly several hundred jobs and close to 50 million francs in additional wages (Table 3). However, the buck does not stop there, as purchasing power generated via intermediate consumptions and employee spending keeps on circulating in the economy.

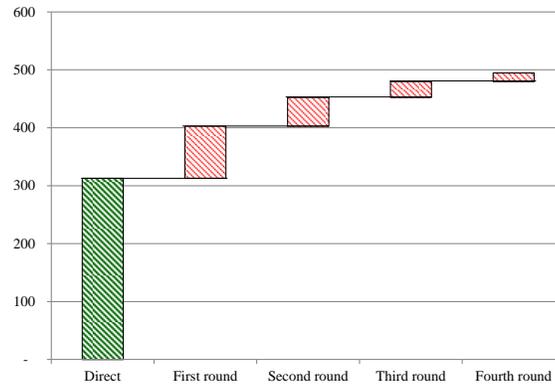
Figure 7
Total employment created by the precious-metal refining sector



Note: Jobs created directly by the precious-metal industry are in the first column. Jobs generated by employee spending and supplier contracts with the precious-metal industry are in the second column. Jobs generated, in turn, by this additional employment and activity are in the third column, and so on.

Source: Authors calculations using industry data

Figure 8
Total value added created by the precious-metal refining sector, million francs



Source: Authors calculations using industry data

All in all, over 2’600 full-time jobs are supported by the precious-metal refining sector in Switzerland (Figure 7), about 1’600 directly and 1’000 indirectly, through the total chain effect of intermediate purchases and the consumption expenditure of employees.¹⁴ When taking into account all induced effects, the sector also generates about half a billion francs in value added (Figure 8) and over 60 million francs in tax revenue every year.¹⁵

4 Switzerland’s recipe for success : A strong industrial cluster

Switzerland’s success stems from the combination of a unique regulatory framework and a closely-knit cluster of precision industries. In spite of high labor costs (see Section 3), Switzerland has managed to establish a strong global position in precious-metal refining, resting on a best-practice domestic legislative framework. The unique feature of Switzerland’s precious-metal regulation (see Box 2) is the existence of assayers (“*essayers jurés*”), some of whom are directly employed by the Central Control Bureau of Precious Metals, under the authority of the Federal Customs administration, and the rest employed by the refiners themselves. Assayers are legally responsible and personally liable for establishing and certifying the title of precious-metal manufactures. As discussed in Section 2, this is key to alleviating moral hazard.

Box 2

Switzerland’s precious-metals control law

Switzerland’s regulatory framework for precious metals dates back to the first federal law passed in 1880, which created the legal status of assayers in order to limit moral hazard in transactions. The law was altered in 1933, at a time when the world gold market had changed fundamentally, and then revised in 1994. The law creates two categories of precious-metal manufactures, with different legal requirements. Watch cases must be officially stamped by the Federal administration (Articles 13-20). Other products must bear a

¹⁴ This number is obtained through detailed calculations based on input-output data and Swiss household expenditure patterns, resulting in a conservative multiplier formula (with a multiplier value below 2). This method of calculation is more reliable than using a ready-made macroeconomic multiplier value because it reflects actual input-output and consumption linkages. For employee consumption, only the consumption of Swiss residents is taken into account.

¹⁵ Value added is the difference between sales and intermediate consumptions. It is the basic building block of Gross Domestic Product.

“master’s stamp” ensuring full traceability. The law also establishes the status, requirements and legal monopoly of assayers (official assayers and trade assayers) over the control and certification of the title of precious-metal products. It stipulates that assayers are personally liable for misrepresentation.

The role of the Federal administration is triple: (i) Certifying the title of products by 40 assayers directly employed by the Central Bureau of Precious Metals Control; (ii) stamping watch cases, which are subjected to a legal obligation of official stamping; (iii) controlling international trade flows. Official assayers undergo rigorous training in both scientific disciplines (physics and chemistry) and law at the EPFL, followed by a two-year apprenticeship.

Although Switzerland’s control system is arguably the tightest in the world, it has mutual-recognition agreements for official stamping with a number of countries including, inter alia, Italy, France, Austria, Spain, and recently Russia. Finally, Switzerland’s precious-metal industry is also subjected, like the banking industry, to the country’s money-laundering regulations under the control of FINMA, Switzerland’s financial markets supervisory authority.

The presence of precious-metal refiners on Swiss soil enables watch-makers to claim the Swiss-made label, a source of competitive advantage. Should the bulk of gold refining move to alternative locations such as Dubai, India or Singapore, shipping refined gold to Swiss watch production facilities would add unnecessary costs, eroding competitive advantage. Perhaps more importantly, the Swiss-made label would not necessarily apply anymore if high-value gold components of watch movements were imported.¹⁶ Alternatively, watch manufacturing could relocate in Asia; but then the competitive edge given by Swiss manufacturing and the Swiss-made label would be lost forever,¹⁷ together with the extensive local know-how and skill base. For instance, melting requires “tacit know-how” that cannot be easily transferred to new workers. Relocation would also go against the current trend in the industry.

The stakes in downstream industries are high for Switzerland. The last census of the Swiss watch-making industry (CPH 2013) shows that total employment stood in 2012 at 55’816 jobs, up 5.7% on 2011, over a quarter of which are in the Neuchâtel canton alone.¹⁸ These jobs, like all industrial jobs, cannot be taken for granted. Watch-industry employment was cut in three, from 90’000 to 30’000, in a matter of just two decades (between roughly 1970 and 1990), when major technical mutations hit the industry. The availability of quality inputs, including precious metals, is one of the sector’s key competitive assets.

The gold-trading activities of Swiss banks also benefit from the presence of refiners. Depending on market conditions, gold trading can represent as much as one tenth of the foreign-exchange earnings of a typical Swiss bank. The ability to provide gold bars with their stamp—gold bars up to 1kg typically bear the issuing bank’s stamp—and guarantee “Swiss gold” with all that goes with it in terms of reputation is key to their competitive advantage. Dealing in imported gold

¹⁶ Until a recent reform, under a 1971 law the Swiss-made label required at least 50% of the value of a clock’s movement to be manufactured in Switzerland. In 2007, Richemond and the Swatch group lobbied the Swiss government for a rise of the cutoff to 60%, a level that was expected to put some of the volume producers, who use more imported parts, in a difficult position. The Swiss-made minimum cutoff was voted up to 60% in January 2013 by the Parliament’s Upper House.

¹⁷ An oft-cited survey of consumer preferences suggested that 75-95% of European consumers were willing to pay a 7%-10% premium for a Swiss-made watch over one produced in Japan and 20% over one made in Hong Kong.

¹⁸ On a full-time equivalent (FTE) basis, the number is closer to 45’000.

refined elsewhere in the world would deprive them of that edge, so much so that, according to one banker interviewed for this report, they would in all likelihood “close shop” without local refiners.

Beyond purely mechanical input-output linkages, the precious-metal sector generates some spillovers for Switzerland’s economic fabric in terms of training, R&D, and innovation.

Precious-metal refiners are involved in R&D collaborations with watch-makers and prestigious schools such as the EPFL and the engineering school in Fribourg in the development of new products and new testing methods and publish their results in scientific journals (mostly without patenting, as testing methods can always be imitated).¹⁹ The industry also provides traineeships for engineers and for graduates of local technical schools—such as SUPSI in Ticino—providing grants and apprenticeships. They are prime customers for high-tech service providers such as SAP, who use them as launch customers for innovative solutions to be deployed later on with other customers, contributing to higher productivity and growth.²⁰ These forms of deep collaboration would not be possible without physical presence and commitment to the local environment.

5 Conclusion

The creation of successful clusters of export-oriented activities, positioned on dynamic and high-quality segments of global markets, is the objective of every industrial-policy plan in every country. Very few such plans succeed. Clusters emerge only progressively and may take decades to reach maturity, beyond the typical horizon of policymakers. Moreover, the recipe for success is elusive as industry clusters react only weakly to standard industrial-policy instruments like tax incentives, technical assistance, or export promotion.

If clusters are difficult to create, they are easy to destroy. Because of their complexity, they are vulnerable to entropy and can collapse if one of their pillars weakens. The place of precious-metal refining in Switzerland’s “gold cluster” is key in this regard, and its economic importance, which, as this report argued, goes beyond its mere size, ought to be balanced carefully with other, non-economic issues in a full analysis of its implications for Switzerland’s prosperity and image.

¹⁹ One of the industry’s major player was the winner of a matching grant from CTI (*Commission pour la Technologie et l’Innovation*), in collaboration with Neuchâtel-based CSEM (*Centre Suisse d’électronique et de microtechnique*) for new product development.

²⁰ The authors are grateful to Mr Khaled Ghanem, from SAP, for detailed information on one of these collaborative projects.

References

Convention Patronale pour l'Horlogerie (2013); *Recensement 2012 du personnel et des entreprises des industries horlogère et microtechnique suisses*; La Chaux de Fonds: CPH.

Deloitte (2012), *Etude Deloitte sur l'industrie horlogère suisse*; Zurich: Deloitte SA, November 2012.

Jodry, Jonathan (2013), "The Role of LBMA Referees"; paper presented at the London Bullion Market Association fifth LBMA Assaying & Refining Seminar, 10-12 March 2013.

Lu, Yi-Chun et al. (2010), "Platinum–Gold Nanoparticles: A Highly Active Bifunctional Electrocatalyst for Rechargeable Lithium–Air Batteries"; *Journal of the American Chemical Society* 132.35, 12170-12171.

World Gold Council (2011), *Gold: The hidden element in innovation*; London, UK: World Gold Council.

— (2013) , *Gold demand trends*; London, UK: World Gold Council.