

A forecasting model to include foreign currency risk management for university library budget requests

Patrick Vanouplines (Patrick.Vanouplines@vub.be)

Head Librarian – Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium

Keywords: library budgets, foreign currency risk management, information resources expenditure prediction model

Summary

We propose a model that takes into account the evolution of both price increases of information resources and fluctuations in foreign currencies. The model is applied to a Belgian and an Indian university library. The proposed model will become a reliable tool for the head librarian when preparing the next year's budget request. It will also make a multi-year forecast much more reliable and realistic. Future extensions of the model are discussed to turn the application more versatile and to take into account the influences of the transition to open access.

Introduction

A head librarian of a university library, or, in general, of a scientific library, is in most cases asked to submit a budget request for the following year. That is a difficult task, but above all a dangerous task. The head librarian is usually well aware of the price increases that are contractually stipulated for multi-year agreements with publishers of electronic journals and databases. Some prices for information resources (such as books, but also journals and databases for which there are no multi-year contracts) are much more difficult to forecast. But whether price increases are fixed or not, the evolution of library expenditures is largely subject to fluctuations in the foreign currencies. It is precisely the price fluctuations that cannot be forecast.

The head librarian must calculate what can be calculated, but also point out to the institute's government that an interruption in the journal collection, or an interruption in access to databases, creates a gap that is difficult to repair.

The head librarian may be asked to submit a multi-year budget request, for example for the next five years. In that case, the assignment becomes even more difficult and dangerous because the evolution of foreign currencies is completely mind-boggling.

Literature review

Foreign currency risk is, according to Wikipedia

(https://en.wikipedia.org/wiki/Foreign_exchange_risk), "a financial risk that exists when a financial transaction is denominated in a currency other than the domestic currency of the company. The exchange risk arises when there is a risk of an unfavourable change in exchange rate between the domestic currency and the denominated currency before the date when the transaction is completed".

In libraries, the risk is often not sufficiently recognized. It is even neglected in the sense that the foreign currency risk is mentioned as a risk in financial audits of (mostly US and Australian public)

libraries, but nothing else is done about it. For example, see the recent publications by Panter & Rivette (2021), Sedestrom (2019) and Uralla Shire Council (2021).

Lynden (1996) described the impact of foreign currencies on library materials and he was one of the first to draw attention to this problem by examining which proportions of acquisitions in American libraries are subject to currency fluctuations. Kapoor (2010) does the same for libraries in India, starting from an analysis of the evolution of foreign currencies against the Indian rupee and warning of the extensive impact of currency fluctuations; she reports that at the Guru Gobind Singh Indraprastha University (Delhi, India) a 10 percent safety margin is included in budget applications for the following year. Ushadevi and Ramasesh (2017) also warn about the impact of currency fluctuations on the purchase of information resources in Indian libraries.

Research method

At the Vrije Universiteit Brussel, each year a budget request for the following year is drawn up, linked (at the request of the university financial department) to an extrapolation for a total of five years. Instead of using very broad, sometimes exaggerated percentual increases for the prices of information resources, since a few years the university library plays more closely. A transparent calculation method is used, with very close rates of price increases. The financial department of the Vrije Universiteit Brussel gained more confidence and promised to provide a buffer for emergencies. It was indicated that this could be the sudden rise in foreign currencies.

The method applied in this paper uses global budget items for the book prices, the contracts with large publishers, and the group of journals and databases for which there is no contract in a consortium or on an institutional basis for several years. The model takes into account the (possible) variation of the foreign currencies for up to five years. The calculation is done in Excel.

For a Belgian university, within the European monetary union, many payments are in euros, and only a smaller share is in US dollars and British pounds. The expenditures on information resources that are considered in this paper are not the real expenditures of the Vrije Universiteit Brussel, but reflect an average, mid-size Belgian university. In this paper it is investigated how a fictional Indian university library is subject to foreign currency fluctuations. This is interesting because an Indian university will spend relatively much more in foreign currencies. In this way, this paper provides a tool for the head librarian to approach the university's financial department with an informed forecast of spending on information resources over the next five years.

Despite the fact that the simulation exercise in this paper is based entirely on a fictional university library, we demonstrate the power of such a simulation model. A head librarian can apply the Excel-model by entering his or her own expenditures for information resources. The research is still ongoing and it is expected that the Excel application will continue to evolve in the near future.

A look at the foreign currencies (to create a sense of urgency)

Almost twenty years ago an article (Vanouplines, 2006) pointed to a financial problem that librarians in Belgium and the European currency union had to contend with. It concerned the discrepancy between information resources on paper (for which libraries in Belgium had to pay a reduced VAT rate within the European currency union, in Belgium 6%) and electronic information resources (for which libraries in Belgium had to pay the standard VAT rate, in Belgium 21%). This was an obstacle to switching from paper to electronic. The request to also switch to the reduced VAT rate for electronic information resources was poorly received by national governments as it meant a significant reduction in revenue for national treasuries. However, falling behind in access to information

resources would have been detrimental to the research in Belgium. After years of striving for equalization of the VAT rate at national and European level, in 2017 the battle was finally won at European level, with implementation at Belgian level in 2019.

The almost twenty-year-old publication thus formed the basis for the current paper in which another problem is addressed: the need to submit a multi-year budget request every year, while there are uncertainties not only in the price evolution of the information resources, but also the evolution of foreign currency can put considerable pressure on the required budget. Where within the eurozone payments are to a great extent made in euros, and to a smaller amount in American dollars and British pounds, the problem of foreign currency risk is even greater in countries where the evolution of the foreign currency can make much greater leaps and bounds, while less of the expenditures are in the local currency.

While the price evolution of the individual information resources components in the coming years is reasonably well known (because, among other things, multi-year contracts with publishers provide some certainty for typically two to five years), the evolution of the exchange rates of foreign currencies is unpredictable. That is why it has to be investigated what has happened with those foreign currencies in recent years. Is it sufficient to take into account that foreign currencies became a maximum of five percent cheaper per year, and a maximum of five or ten percent more expensive? In tables 1 and 2 the evolution of foreign currencies is shown over the years 2010-2015. The averages were taken over an entire year. This is presented successively for the situation of a Belgian university library (which uses the euro as its base currency and purchases information resources in US dollars and British pounds) and for the situation of an Indian library (which uses the rupee as its base currency and purchases information resources in US dollars, British pounds and euros).

Table 1. Evolution of USD and GBP versus EUR over the period 2010-2015 (source valuta:

<https://www.ofx.com/en-ie/forex-news/historical-exchange-rates/>)

Year	USD → EUR	Percent change (since 2010)	GBP → EUR	Percent change (since 2010)
2010	0.7534	0	1.1648	0
2011	0.7180	-4.69	1.1522	-1.08
2012	0.7778	3.24	1.2327	5.83
2013	0.7527	-0.08	1.1777	1.11
2014	0.7524	-0.13	1.2399	6.45
2015	0.9026	19.82	1.3772	18.24

Table 2. Evolution of EUR, USD and GBP versus INR over the period 2010-2015 (source valuta:

<https://www.ofx.com/en-ie/forex-news/historical-exchange-rates/>)

Year	EUR → INR	Percent change (since 2010)	USD → INR	Percent change (since 2010)	GBP → INR	Percent change (since 2010)
2010	60.49	0	45.64	0	70.50	0
2011	64.55	6.71	46.32	1.49	74.38	5.50
2012	68.53	13.30	53.32	16.83	84.50	19.85
2013	77.36	27.89	58.26	27.65	91.03	29.12
2014	80.96	33.85	60.99	33.63	100.45	42.48
2015	71.08	17.51	64.08	40.41	97.91	38.88

If the evolution of the foreign currency against the home currency is to be simulated, is then an annual growth rate of, say, five percent or ten percent sufficient? In the tables 3 and 4 the evolution is considered of the currencies over two periods: over the period 2010-2015 and over the period 2017-2022. From this it is deduced that it is sufficient for a Belgian library to estimate an evolution of five percent (both in terms of foreign currencies becoming cheaper and those currencies becoming more expensive). For an Indian library, however, a potential increase should be used of ten percent in terms of foreign currencies becoming more expensive.

Table 3. Evolution of the currencies (with respect to EUR) over 2010-2015 and 2017-2022 (source valuta: <https://www.ofx.com/en-ie/forex-news/historical-exchange-rates/>) (for the year 2022 only currencies up to October 16th were included)

Year	% change since 2010 or 2017 USD → EUR	% change since 2010 or 2017 GBP → EUR	5% increase
2010	(base year)		
2011	-4.69	-1.08	5.00
2012	3.24	5.83	10.25
2013	-0.08	1.11	15.76
2014	-0.13	6.45	21.55
2015	19.82	18.24	27.63
2017	(base year)		
2018	-4.31	-0.94	5.00
2019	0.89	-0.14	10.25
2020	-1.06	-1.48	15.76
2021	-4.49	1.93	21.55
2022	6.62	3.33	27.63

Table 4. Evolution of the currencies (with respect to INR) over 2010-2015 and 2017-2022 (source valuta: <https://www.ofx.com/en-ie/forex-news/historical-exchange-rates/>) (for the year 2022 only currencies up to October 16th were included)

Year	% change since 2010 or 2017 EUR → INR	% change since 2010 or 2017 USD → INR	% change since 2010 or 2017 GBP → INR	10% increase
2010	(base year)			
2011	6.71	1.49	5.50	10.00
2012	13.30	16.83	19.85	21.00
2013	27.89	27.65	29.12	33.10
2014	33.85	33.63	42.48	46.41
2015	17.51	40.41	38.88	61.05
2017	(base year)			
2018	9.814	1.49	8.71	10.00
2019	7.34	16.83	7.14	21.00
2020	14.98	27.65	13.38	33.10
2021	19.05	33.63	21.28	46.41
2022	11.89	40.41	15.53	61.05

Subdivision of expenditure on information resources in a fictional Belgian university library

In order to make a realistic forecast of the evolution of the necessary budget for information resources within one to five years, the expenditure is subdivided as presented in table 5. In this table, the distribution of components is a reflection of the expenditure of a medium-sized university in Belgium. An expenditure (in euros) is assigned to each component that is representative for such a university. There are three fractions for each component: a portion paid in euros (EUR, the local currency), a portion in US dollars (USD), and a portion in British pounds (GBP).

Table 5. Subdivision of expenditure on information resources in a fictional Belgian university library

Information resources component	Expenditure in EUR	Fraction in EUR	Fraction in USD	Fraction in GBP
Books & monographies	€ 250,000	60%	30%	10%
Subscriptions serials	€ 1,500,000	50%	35%	15%
Package deals institutional	€ 1,000,000	100%	0%	0%
Loose-leaf & binding	€ 200,000	100%	0%	0%
Package deals in consortium	€ 400,000	70%	20%	10%
Total expenditure	€ 3,350,000			

Then the increase in information resources costs per component is estimated. This increase is expressed as a percentage increase per year. This is acceptable for the "Books & monographies" component, although a different price increase per currency used may be more realistic. The price increases for the components "Subscriptions serials" and "Package deals institutional" are based on EBSCO (2022). For the component "Loose-leaf & binding" the same increase as for the books is assumed. The "Package deals in consortium" component could actually be further subdivided into individual contracts with publishers, but that would take us too far in this paper. Table 6 shows the yearly price increases, used in this paper, with a low, a medium and a high increase (the medium increase values are the ones that correspond to EBSCO (2022)).

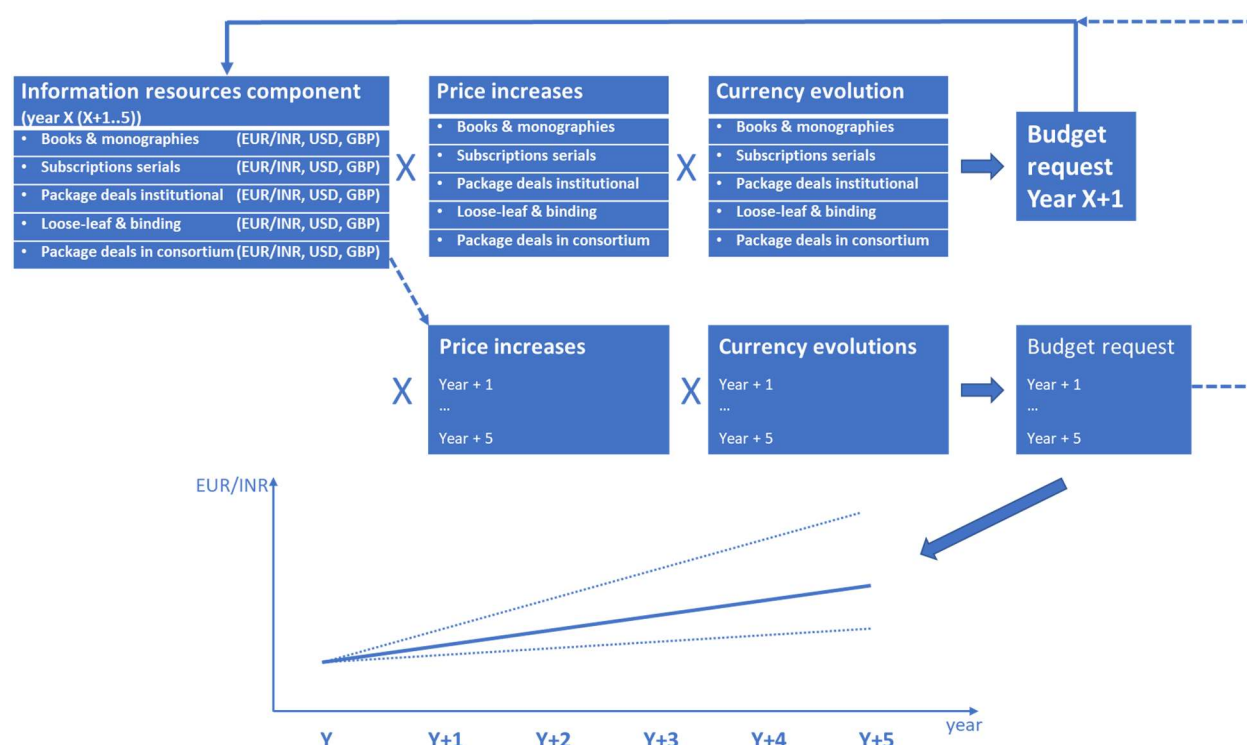
Table 6. Price increases as used in this paper for the information resources components.

Information resources component	Yearly price increase (low) medium (high)
Books & monographies	(1%) 2% (3%)
Subscriptions serials	(3%) 5% (7%)
Package deals institutional	(2%) 3% (4%)
Loose-leaf & binding	(1%) 2% (3%)
Package deals in consortium	(2%) 3% (4%)

Block model of the Excel application

Figure 1 shows a block model of the forecasting model. At the bottom of figure 1 a schematic representation of the output, as a graph, is shown.

Figure 1. Block model of the forecasting model



Application to a fictional Belgian university library

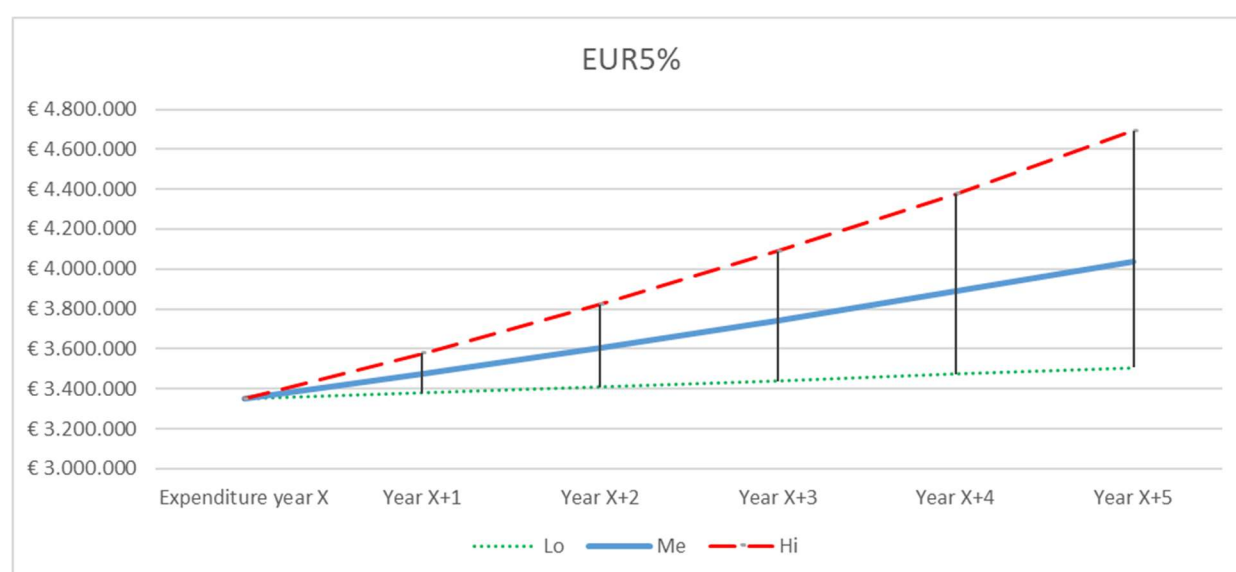
Table 7 gives the results of the model starting from current year X to five years further in the future, for a fictional Belgian university library that purchases in its local euro and in US dollars and British pounds. The column headed "Medium" shows the results without the influence of the possible variation of the foreign currencies. The column headed "Low (-5%)" is the calculation at which the foreign currencies (US dollars and British pounds) become five percent cheaper each year. The column headed "High (+5%)" is the calculation where foreign currencies become five percent more expensive each year.

Table 7. Model output for a fictional Belgian university library.

Year	Low (-5%)	Medium	High (+5%)
Year X (= now)	€ 3,350,000	€ 3,350,000	€ 3,350,000
Year X+1	€ 3,377,705	€ 3,476,000	€ 3,576,015
Year X+2	€ 3,407,258	€ 3,607,190	€ 3,821,187
Year X+3	€ 3,438,672	€ 3,743,799	€ 4,087,425
Year X+4	€ 3,471,962	€ 3,886,066	€ 4,376,847
Year X+5	€ 3,507,144	€ 4,034,242	€ 4,691,805

When these calculations are presented to the university financial department, a graphic representation of the calculations should not be missing. This is presented in figure 2.

Figure 2. Graphical representation of the model output for a fictional Belgian university library.



In figure 2, it is seen that spending on information resources continues to rise, whatever the increase or decrease of the foreign currencies (within five percent boundaries). This is due to the combination of the increase in information resources prices and the evolution of foreign currencies. In other words, even with a relatively small increase in foreign currencies, the increase in spending on information resources will at most be mitigated. This is different from an Indian university library, as it is shown in the next section.

Application to a fictional Indian university library

The application of the model to a fictitious Indian university library is analogous to the application to the fictitious Belgian university library. The expenses in euro are converted to rupee, and the fractions of the expenses in foreign currencies are adapted, as shown in Table 8.

Table 8. Subdivision of expenditure on information resources in a fictional Belgian university library

Information resources component	Expenditure in INR	Fraction in INR	Fraction in EUR	Fraction in USD	Fraction in GBP
Books & monographies	₹ 15.000.000,00	10%	20%	40%	30%
Subscriptions serials	₹ 90.000.000,00	10%	20%	40%	30%
Package deals institutional	₹ 60.000.000,00	5%	20%	45%	30%
Loose-leaf & binding	₹ 12.000.000,00	15%	30%	30%	25%
Package deals in consortium	₹ 24.000.000,00	5%	15%	50%	30%
Total =	₹ 201.000.000,00				

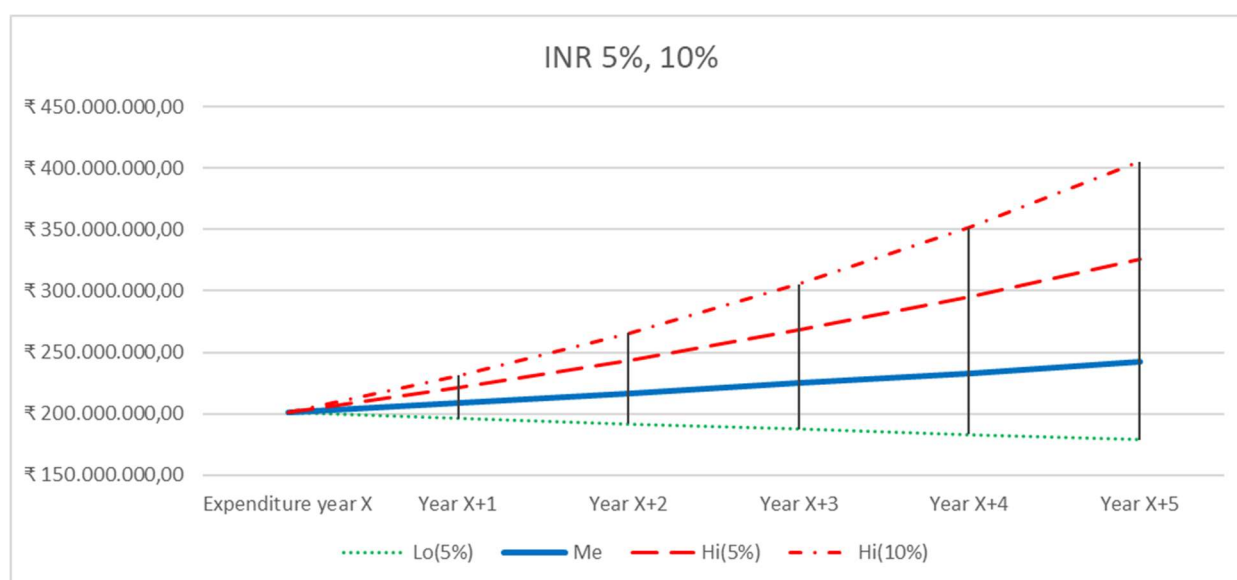
Two model simulations are performed. The first simulation applies a five percent variation of the foreign currencies, and the second simulation applies a ten percent variation (but only to the case of an increase of the foreign currencies). Note that the information resources components in the Indian university library will of course be for a much larger share in foreign currencies. The results of both simulations are presented in table 9.

Table 9. Model output for a fictional Indian university library.

Year	Low (-5%)	Medium	High (+5%)	High (+10%)
Year X (= now)	₹ 201,000,000	₹ 201,000,000	₹ 201,000,000	₹ 201,000,000
Year X+1	₹ 196,211,850	₹ 208,560,000	₹ 221,173,650	₹ 230,877,300
Year X+2	₹ 191,586,814	₹ 216,431,400	₹ 243,469,371	₹ 265,420,001
Year X+3	₹ 187,120,415	₹ 224,627,934	₹ 268,118,152	₹ 305,374,751
Year X+4	₹ 182,808,339	₹ 233,163,971	₹ 295,376,819	₹ 351,609,658
Year X+5	₹ 178,646,430	₹ 242,054,545	₹ 325,530,986	₹ 405,134,303

The graphical representation of the simulation results in figure 3 shows a double line for the increase in foreign currencies, the top line for a ten percent increase, the other line for a five percent increase.

Figure 3. Graphical representation of the model output for a fictional Indian university library.



In figure 3 it is seen that in the worst-case scenario (with a ten percent increase in the price of foreign currencies), expenditure on information resources could almost double over a period of five years. If a yearly ten percent increase in foreign currencies becomes a reality for an Indian university library. The situation for a Belgian university library, as described in the previous paragraph, is less subject to fluctuations of the foreign currencies (because a large part of the information resources are paid in euro, the local currency). The Indian university library must therefore submit a possibly much more pessimistic budget request with its annual budget request (accompanied with a five-year forecast).

On the other hand, when the foreign currencies become cheaper by five percent, this results in a slightly smaller budget requirement for the Indian library. The price decrease of foreign currencies (by five percent), used in this simulation, makes that the yearly price increase of the information resources components is compensated. That is favorable result, that might never occur. It should be advised that the head librarian projects at least an equal budget (rather than a decreasing budget). This can be done by taking the percentage of the price decrease of foreign currencies somewhat smaller than the five percent used here.

Conclusion

A model was developed that allows a university library head librarian to submit a realistic, secure and reliable budget request, not only for the following year, but also accompanied by a five-year forecast. The novelty of this model is the inclusion of the evolution of foreign currencies. The proposed model shows that the inclusion of the evolution of foreign currencies is of great importance for even a Belgian university library that spends a lot of money in its local currency, the euro. The model also showed that an Indian university library is much more sensitive to foreign exchange fluctuations, because spending in the local currency makes up only a small share of total spending, which is mostly in US dollars, British pounds and euros. With the proposed model, the head librarian can paint a much more realistic picture for the university than if only the price increases of the information resources components were taken into account.

Recommendations for further research

Open access is not touched in this paper: it was assumed, for simplification, that open access does not exist. That's a rough assumption, which may not be so wrong (at least, at present): publishers will never want less revenue, and often the pricing models are built in such a way that most forms of open access agreements lead to a similar net revenue for the publishers (provided the contracts are well negotiated by the libraries) (and of course with an annual price increase to satisfy the shareholders). A better inclusion of the open access models, and their influence on future price evolutions, is a point of attention for further refinement of the proposed model.

The current model is an Excel application. Many input values must be entered manually. In order to make the model in Excel usable in other libraries, a next version will, for example, have an input form in which the starting values can be easily entered. The Excel application then displays the resulting charts, without the head librarian having to worry about the inner workings of the Excel application.

Another step in the development of the Excel application involves splitting the large blocks of information resources components such as the institutional package deals and deals that are part of a consortium. Particularly with regard to the larger contracts, the term of those contracts must be taken into account: if a deal still runs over three years, then in years four and five an estimate of the price evolution must be taken into account for that contract.

The predictions of the model must also be compared with the actual expenditures: are the assumptions correct, or should they be adjusted more optimistically or more pessimistically in the coming years? Carrying out this step properly increases the credibility of the university government in the head librarian and the proposed budgetary evolutions will be taken more seriously because the forecasts will be more responsive to the actual price increases.

Currently, the Excel application assumes that payments are spread over the year (an average exchange rate over a whole year was taken). That is not correct. In Belgian university libraries, part of the payments in year X are already made in December of year X-1, and most of the other payments are made in the months January to March. This must be taken into account in order to check the forecasted expenditure against the actual expenditure.

A final recommendation concerns the fact that for the portion of payments in the local currency, the significant increases and decreases of foreign currency rates will also, with a lag of than one year, be reflected in the price increases, in the local currency, of the information resources components. This

is probably more important for Belgian university libraries than for university libraries in India (which make relatively fewer payments in their local currency).

References

EBSCO (2022). 2023 Serials Price Projection Report. Online:

<https://www.ebsco.com/sites/default/files/acquiadam-assets/EBSCO-Serials-Price-Projections-Report-2023.pdf>

Kapoor K. (2010). Impact of exchange rates on periodicals subscription in Indian libraries. In: Collection Building, 29(3), p. 91–97

Lynden F.C. (1996). Impact of foreign exchange on library materials budgets. In: The Bottom Line: Managing Library Finances, 9 (3), p. 14–19

Panter A.D. & Rivette J.L. (2021). Public Library Financial Management Guide. 107 p. Online: https://www.michigan.gov/-/media/Project/Websites/libraryofmichigan/For-Libraries/Administration/Financial-Management/LM_2021_Financial_Management_Guide.pdf?rev=d7e08037e77f4af4bf791d0e86ab50d0

Sedestrom D.K. (2019). Allen County Public Library – Comprehensive Annual Financial Report for the Fiscal Year Ended December 31, 2018. 123 p. Online: <https://acpl.lib.in.us/images/Documents/CAFR/2019cafr.pdf>

Uralla Shire Council (2021). Annual Financial Statements for the year ended 30 June 2021. 118 p. Online: <https://www.uralla.nsw.gov.au/files/assets/public/council/financial-statements/financial-statements-for-the-year-ended-30-june-2021.pdf>

Ushadevi L. & Ramasesh C.P. (2017). International Journal of Library & Information Science (IJLIS), 6(6), p. 25–36

Vanouplines, P (2006). Invloed van btw en inflatie op collectievorming. In: Bibliotheek- en Archiefgids, 82, 3-8. In Dutch; translation: Influence of VAT and inflation on collection formation. Online: https://cris.vub.be/ws/portalfiles/portal/38796178/meta_magazine_article_pdf_200602_Vanouplines.pdf