Banc Ceannais na hÉireann
Central Bank of Ireland
Eurosystem

Financial Stability Notes

COVID-19 and the transmission of shocks through domestic supply chains

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Vol. 2020, No. 3

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April 2020

Abstract

Inter-sectoral linkages play an important role in transmitting the economic shock resulting from COVID-19. In particular, upstream (supplier) sectors that are not directly exposed to COVID-19 containment policies can be affected if their downstream (customer) firms suffer acute revenue losses. In this Note, we use input-output tables to identify such linkages. We highlight that EUR 35bn-40bn of business-to-business purchases in 2019 were by companies in sectors currently experiencing sharp revenue losses as a result of COVID-19 containment policies; firms making these sales are at risk of experiencing a knock-on liquidity shock through the supply chain. We also note sectors whose customers are less affected, which may act to mitigate the effects of the shock. Finally, we note that transmission from upstream suppliers to downstream firms is likely to be smaller than in the opposite direction, due to the nature of the current shock.

1 Introduction

Links between Irish business sectors are likely to play an important role in transmitting the economic shock resulting from COVID-19 containment policies. In particular, upstream (supplier) sectors that are not impacted by COVID-19 containment policies could nonetheless be affected via their downstream business customers. For example, if their business customers cease to operate, or experience liquidity shocks that preclude them from meeting all of their short-term obligations, there could be flow-on effects to upstream firms who are otherwise able to continue normal operations.

In assessing the direct impact of the COVID-19 shock on the Irish economy, we follow McGeever, McQuinn and Myers (2020) in assessing sectoral-level vulnerability. We place all 2-digit NACE sectors of economic activity into one of three categories:

- *Red* (highly vulnerable) – sectors directly affected by "social distancing" type policies that restrict the ability of customers to purchase from firms, e.g. hotels, restaurants, cinemas, non-essential retail outlets.
- *Amber* (moderately vulnerable) - sectors where "social distancing" type policies place some limitation on supply capacity in the sector, e.g. construction.
- *Green* (less vulnerable) – sectors that can continue to operate through the shock, e.g. pharmaceutical manufacturing.

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Red and *Amber* sectors account for large shares of Irish economic activity. Around 128,000 SMEs, representing 79 per cent of all non-agriculture SMEs in Ireland, are operating in either an *Amber* or *Red* sector (McGeever, McQuinn and Myers, 2020).[2] These firms have an estimated 770,000 employees (or 50 per cent of all those working in the private non-agriculture business economy), and a further 261,000 employees are estimated to work in large companies in *Amber* or *Red* sectors.[3] The Central Bank's recent *Quarterly Bulletin* has highlighted the risks facing these most-exposed sectors, with forecasts for falls in Gross Value Added of over 30 per cent in 2020 in the Distribution, Transport, Hotels and Restaurants, and the Arts, Entertainment and Other Services sectors, and falls between 20 and 30 per cent in the Professional, Admin and Support Services, and Real Estate Activities sectors.

In this *Note*, we highlight that the direct consumption effect of COVID-19 restrictions is not the only immediate risk facing Irish enterprises. Firms may also be exposed through their supply chains, particularly where their output in normal times goes to firms directly exposed to the COVID-19 shock. We focus on domestic supply chain linkages in this paper; important issues such as vulnerabilities through the disruption of global supply chains and the potential risks to firms from a generalized global economic downturn are beyond the scope of this Note.

There are three distinct elements to the risks facing Irish firms as a result of domestic supply chain linkages:

(1) ***Missed payments due***. If affected firms have insufficient liquidity, they are less likely to be able to pay their upstream suppliers for the goods and services they have recently received. For example, a hotel may have purchased drinks and food, and procured marketing and accounting services on credit in the run-up to the COVID-19 shock. The immediate freeze in demand for the hotel now risks causing a knock-on payment shock for all of these goods and services providers.

(2) Future demand shock. It is now highly likely that many of the sales that upstream supplier firms would normally have made from March onwards to affected firms will not be realised in 2020. This creates a cascading demand shock from the end consumer, through the affected sector, and onward to all upstream suppliers of goods and services.

(3) Input sourcing instability. Where firms are reliant on inputs from upstream firms who are unable to operate due to COVID-19, it may be that downstream firms struggle to obtain the inputs that they need. For example, if firms in *Green* sectors purchase a substantial quantity of their inputs from *Red* sector firms, the price or availability of their inputs will likely change.

We highlight that many of the sectors with linkages to domestic *Red* or *Amber* sectors are themselves identified as *Green* (i.e. without direct exposure to the restricting effects of COVID-19). The main effect of the COVID-19 crisis on these firms in the next few months is therefore likely to come from these supply chain linkages.

The role of such interconnections in the propagation of shocks has been highlighted during previous crises. Recent examples include the United States auto industry bailout during the global financial crisis, where the significant overlap in the suppliers and dealers of the bailed-out automakers, GM and Chrysler, was seen to pose a risk to the entire industry. The possibility of such cascade effects due to inter-linkages was also a key argument for government bailouts of several large financial institutions during the financial crisis of 2007–2008.[4]

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[2] Figures in McGeever, McQuinn and Myers (2020) are derived from business statistics data from the CSO, which refers to 2017 information on firm activity.

[3] These figures are calculate from CSO business statistics that do not include Agriculture or Public Service employment, and whose coverage sums to 1.5 million private sector business employees in total.

[4] Examples referenced in research on the macroeconomic effects of supply chain linkages by Acemoglu et al. (2012).

Based on the most recent available Input-Output table estimates from the CSO, we estimate that there were €32bn worth of annual business-to-business sales to firms in either *Red* or *Amber* sectors in Ireland in 2015. Of these, €12bn came from firms in *Green* sectors. Assuming the same growth rates as for underlying features of the economy such as domestic demand and GNI*, ***purchases by customer firms affected by COVID-19 are likely to have been €35bn-€40bn in 2019***.

The above purchases were not all carried out on trade credit, nor will all purchases on trade credit be missed due to COVID-19. However, the scale of trade credit activity is relatively large in Ireland: using Quarterly Financial Account data for 2019Q3, trade credit liabilities stood at €250bn in aggregate outstanding amounts. This constituted 13 per cent of all Irish NFC liabilities, and was equivalent to 38 per cent of the size of outstanding NFC loan liabilities.[5] If even a relatively small percentage of the aggregate stock of trade credit is compromised due to COVID-19, the cascading effects could be large. For example, 1 per cent of the total stock of trade credit, €2.5bn, is nearly as large as the annual flow of bank lending to non-financial, non-real-estate SMEs.

Due to a lack of data at the firm or sector level on how much of the above inter-sectoral flows are typically purchased on trade credit, we do not attempt to forecast how much of the overall stock of trade credit might be currently compromised due to COVID-19. Liquid assets and access to undrawn existing credit lines will allow some firms to pay any debts they may owe to their suppliers, mitigating any possible transmission of the COVID-19 shock. However, internal analysis and industry engagement suggests that half of SMEs may have 3-6 months, or less, of liquid assets to meet expenses. McGeever, McQuinn and Myers (2020) suggest that these available liquidity sources are unlikely to be adequate to meet aggregate SME financing needs in the initial three months after the shock, with additional liquidity supports needed. In addition, relative to other expenses falling due for SMEs that may be met from existing liquidity like rent, rates, taxes and utilities, the economic fallout from missed payments in the supply chain may affect the real economy much more, as one business missing payments can cascade liquidity difficulties upstream.

Those designing policy interventions to support enterprise liquidity, whether they be through loan supports, loan guarantees or direct grants, should consider the importance of outstanding trade credit liabilities as of March 2020 being met. Further stimulus of demand beyond payments currently due, to ensure the economic flows highlighted in this paper continue through 2020, requires a different policy calculation, given the uncertainty around the ability of firms in certain most-affected sectors to operate over the next year.

2 Why inter-sectoral linkages matter

COVID-19 has led to an unprecedented shock to enterprise revenues in some sectors of the economy. Despite government interventions to cover employee compensation and to defer taxes and charges, other payment obligations may fall due before businesses can regain pre-shock revenues. Without ample liquidity buffers, those firms may become insolvent.

Natural disasters and financial shocks can propagate through the supply chain to exacerbate the initial directly-felt effects of the shock. Studying the Japanese earthquake of 2011, Carvalho et al. (2016) document that the disruption caused by the earthquake and its aftermaths propagated through upstream and downstream supply chains, affecting the direct and indirect suppliers and customers of disaster-stricken firms, and that the propagation effects led to an additional 1.6 per cent fall in Japan's GDP. Barrot and Sauvagnat (2016) focus on downstream shocks from upstream supplier industries to their customer firms and show that supply chain disruptions due to earthquakes increase input prices and lower GDP. Other research has shown that credit supply shocks to firms in the supply chain, for example those occurring as a result of bank risk appetite

[5] These figures are of course dominated by large MNEs in the Irish NFC sector, and may not give an accurate depiction of the importance of trade credit for an average local SME.

retrenchment after 2008, lead to negative effects not only for the firm with less access to credit, but also to that firm's connections through the supply chain (for example, Alfaro et. al., 2018).

In Ireland, it is expected that supply chains will endure similar shocks over the first half of 2020, despite private- and public-sector mitigation initiatives. Income support schemes reduce the risk that payroll costs after the economic shock will lead to firm failure, through the Temporary Wage Subsidy Scheme and the Pandemic Unemployment Payment. Thousands of firms have arranged payment moratoria with their banks. Affected firms have also received deferrals on, or promises to defer, certain other expenses such as taxes, utilities bills and local rates. The duration and coverage of such policies remain uncertain, as does the distribution of ultimate cost between firms, service providers and government. In many cases, businesses and their landlords are likely to re-negotiate rents, with some early indications that many firms will receive a temporary reprieve.

In light of the foregoing impacts and mitigations, we identify three channels through which inter-sectoral linkages between firms may amplify the COVID-19 shock:

(1) ***Missed payments due***, where existing trade credit liabilities of *Red* or *Amber* firms are not met due to the collapse in revenues of these affected firms.

(2) ***Future demand shock*,** where purchase orders from *Red* or *Amber* firms do not materialize over the coming months.

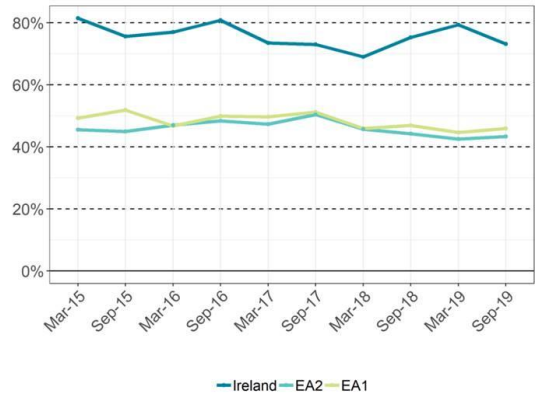
(3) ***Input sourcing instability*,** where firms that typically source inputs to production from *Red* or *Amber* firms either face reductions in quantity, delays, or higher prices, with knock-on effects for their outputs and consumers.

As highlighted in the introduction, trade credit linkages are particularly large in Ireland, but total stock and flow statistics can be dominated by large multi-national enterprise activity. We resort to the ECB/EC *Survey on Access to Finance of Enterprises* to assess Irish SME trade credit. Figure 1, Panel (a) reports that the share of Irish firms reporting trade credit as a financing source in the previous six months has consistently been close to 75 to 80 per cent, compared to 40 to 50 per cent in the average European country. Panel (b) shows that this is consistent across firm size groups, with slightly more Medium firms reporting usage than smaller firms.[6]

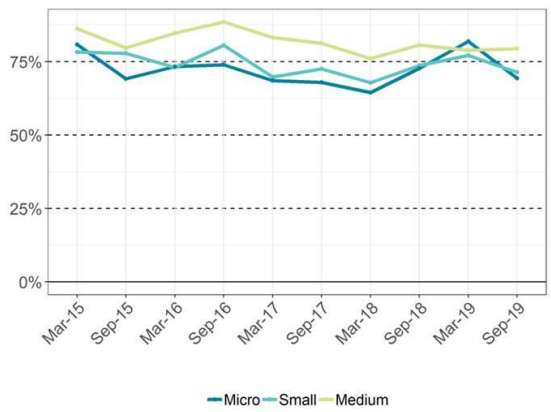
[6] The caveat to these results is that they simply describe whether or not the business used trade credit, whereas the ideal measurement would be importance of trade credit as a share of total liabilities.

Figure 1: The usage of trade credit as a financing source across European SMEs

(a) Percentage of SMEs reporting usage of trade credit as a financing source in previous six months



(b) ***Percentage of firms reporting usage of trade credit as a financing source in previous six months within Ireland by size***



Source: ECB/EC SAFE survey, 2015 to 2019. EA1 countries include Austria, Belgium, Germany, Finland, The Netherlands and France. EA2 countries include Portugal, Italy, Spain and Greece.

3 Measuring inter-sectoral linkages

In order to determine which inter-sectoral links are most important in Ireland, we classify firms according to their *Red-Amber-Green* status, and identify sectors with the largest linkages to firms in affected sectors.

We identify vulnerable sectors based on their direct exposure to the effects of COVID-19 containment policy. *Red* sectors are predominantly located in the hotels, restaurants, arts, entertainment, non-grocery retail and real estate services sectors. *Amber* firms are located in the construction, transportation and storage, and administrative services sectors. *Green* firms are located in sectors such as agriculture, information and communication, groceries and some manufacturing. A complete list of NACE 2-digit sectors and their RAG status is provided in the Appendix, following McGeever, McQuinn and Myers (2020) with some minor alterations to ensure appropriate classification for the purposes of this analysis of supply chain interaction.[7]

In the analysis, we consider the total transfer of output, not just value-added, since revenues and accounts payable are based on total flows. The links we identify are based on domestic flows of inputs and outputs only. [8]

We compare the cross-sectoral flows using three different approaches. The first approach examines the actual level of flows between sectors. This gives a sense of the amount of economic

[7] In other COVID-19 research, supply chain linkages may be classified as a risk. Here, supply chains are the risk transmission channel under assessment, so the initial classification of sectors across Red, *Green* and *Amber* sectors may vary slightly..

[8] When considering the proportion of inputs and outputs, we include imports and exports in calculating the sectoral totals. However, we do not consider links between Irish and international sectors. We do not, for example, note the proportion of food inputs that come from foreign Agricultural, Forestry and Fisheries sectors. Import-export supply chain disruptions have instead, where known, been incorporated into our assessment of whether an Irish sector is considered Red, Amber or Green.

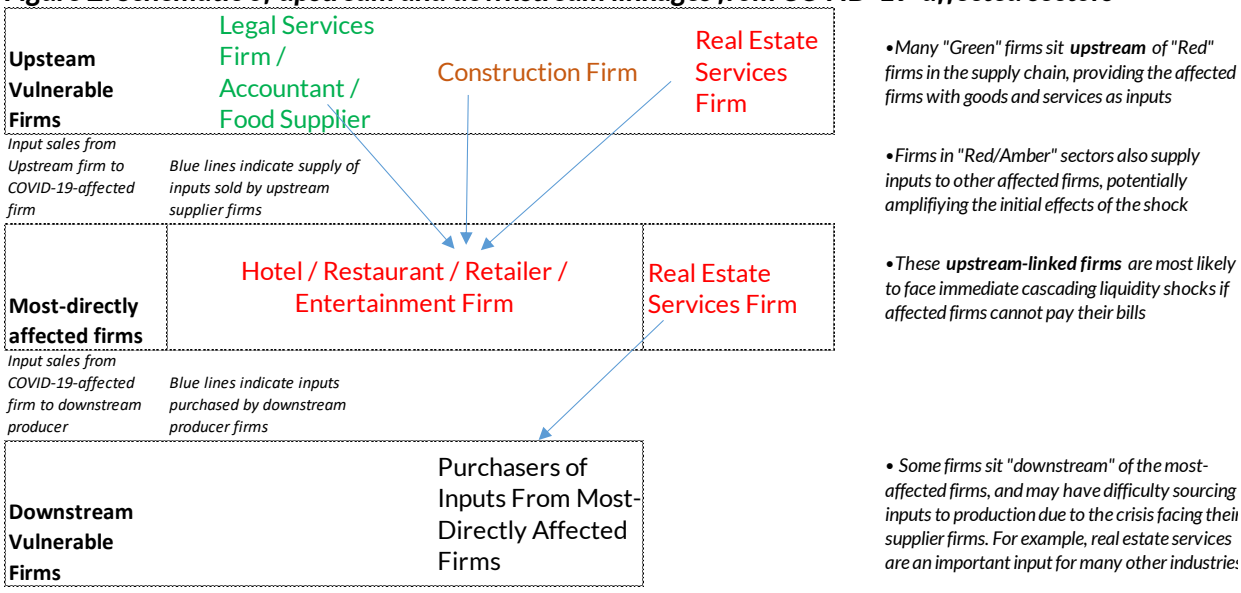
activity that is at risk due to these linkages, which can in turn help to assess the effects on aggregate output. This analysis is outlined in section 3.1.

The second method is to look at comparative volumes of flows between sectors. Where an upstream sector sells a large proportion of its output to a downstream sector, firms in the first sector are more vulnerable, as their revenue sources are less diversified. Similarly, in some cases links from upstream sectors could result in downstream failure, if suppliers are forced to reduce operations or close. This analysis is provided in section 3.2.

Finally, we assess the prospect of input sourcing disruption by measuring the reliance of sectors on affected sectors for large proportions of their inputs to production in section 3.3.

The concepts of upstream and downstream linkages, with examples of firms upstream and downstream of the firms most directly affected by COVID-19, are illustrated in the Figure 2.

Figure 2: Schematic of upstream and downstream linkages from COVID-19-affected sectors



3.1 Size of flows between sectors

We estimate annual business-to-business sales of €32bn to firms in either *Red* or *Amber* sectors, based on 2015 Input-Output table estimates; of these, €13.5bn were supplied by firms in *Green* sectors (Table 2). Assuming a compounded growth rate in underlying economic activity since 2015, these economic flows are likely to have been between €35bn and €40bn in 2019.

In addition, firms classified as *Amber* supplied €12bn of goods and services in 2015 to other firms in *Red* or *Amber* sectors, which amplifies their initially-suggested vulnerability to the shock. Likewise, firms in *Red* sectors sold €3bn of goods and services to each other. Firms involved in these "*Red*-to-*Red*" sales are likely the most vulnerable to financial stress in the immediate term. In each case, an estimate for 2019 can be arrived at by adding 15 to 20 per cent to each flow.

These flows can be compared to €59bn of 2015 sales to firms in *Green* sectors, who are more likely to continue operations. In particular, the €15bn of sales from *Red* or *Amber* firms to firms in the *Green* sectors should act to mitigate the effect of the collapse in final consumption demand for the businesses most at risk, to the extent that the sales can be deferred.

Relative to sales to other parties (final consumers, export markets and government), these business-to-business flows are on aggregate relatively small. For comparison, total outputs of *Green*, *Amber* and *Red* sectors in 2015 were €247bn, €118bn and €87bn, respectively. However, relative to other metrics such as total enterprise lending, these flows are large. Despite their

relative size in overall activity, these business to business flows can be considered as a potential amplification mechanism to the initial COVID-19 shock.

Table 1: Inter-sectoral economic activity, estimates with 2015 IO tables, EUR Millions

	Downstream firms, purchasing inputs			
Upstream producers, selling inputs	**RED Buyer**	**AMBER Buyer**	***Vulnerable Buyers***	**GREEN Buyer**
GREEN Producer	7,111	6,336	13,447	43,895
AMBER Producer	3,421	8,492	11,913	8,506
RED Producer	3,013	2,714	5,727	6,352

Examining specific 2-digit sectors, we can also determine where the greatest vulnerability to highly or moderately affected (*Red* and *Amber*) sectors lies. The Construction sector has the largest overall exposure to *Red* and *Amber* sectors, totalling €4.2bn. This represents a quarter of that sector's overall output.

By contrast, in the Warehousing sector, sales to *Red* and *Amber* sector firms amount to €1.4bn, but represent 60 per cent of total sector output. Other sectors with large proportional exposures to *Red* and *Amber* sectors include Real Estate activities and Administrative and Support Services.

A number of *Green* sectors have substantial sales exposures to *Red* or *Amber* sectors. These include Legal and Accounting Activities, Financial Service Activities, and Compute Programming and Information Services.

Table 2: Largest 2-digit sectors, by annual sales to firms in vulnerable (Red or Amber) Buying Sector, 2015 I-O table estimates.

Producer Sector	Annual Flows, € M	% Share of producer sector's total output
Construction (41 to 43)	4,158	24
Real estate activities (68)	1,808	9
Financial service activities, except insurance and pension funding (64)	1,786	8
Computer programming, consultancy and Information service activities (62,63)	1,646	3
Legal and accounting activities (69)	1,593	29
Administrative and support service activities (80 to 82)	1,476	44
Warehousing and support activities for transportation (52)	1,374	60
Electricity, gas, steam and air conditioning supply (35)	1,290	21
Advertising, other professional, scientific, technical and veterinary activities (73 to 75)	1,183	13
Head office and management consultancy activities (70)	1,100	27

3.2 Proportional vulnerability

Many sectors have large volumes of sales to *Red* or *Amber* sectors, but these comprise only a share of their total sales, as shown in Section 3.1. The converse is also true. Supply chain disruption may threaten businesses more if they have a larger share of sales to the most-affected sectors.

In total, *Green* sectors sell around 3% of their output each to *Red* sectors and *Amber* sectors. Clearly, this is quite small relative to their total production. However, there is significant heterogeneity across sectors. The Warehousing, and Repair of Machinery and Equipment sectors sell over half of their output to *Red* or *Amber* sectors (Table 3).

The list of highly exposed sectors includes some which might, at first glance, appear resilient to COVID-19 containment constraints, as their work is less likely to require physical premises. For example, many activities in the Legal and Accounting sector can likely be conducted remotely. However, if firms in such sectors normally make a large proportion of their sales to highly liquidity-affected firms, they could experience large "knock-on" effects.

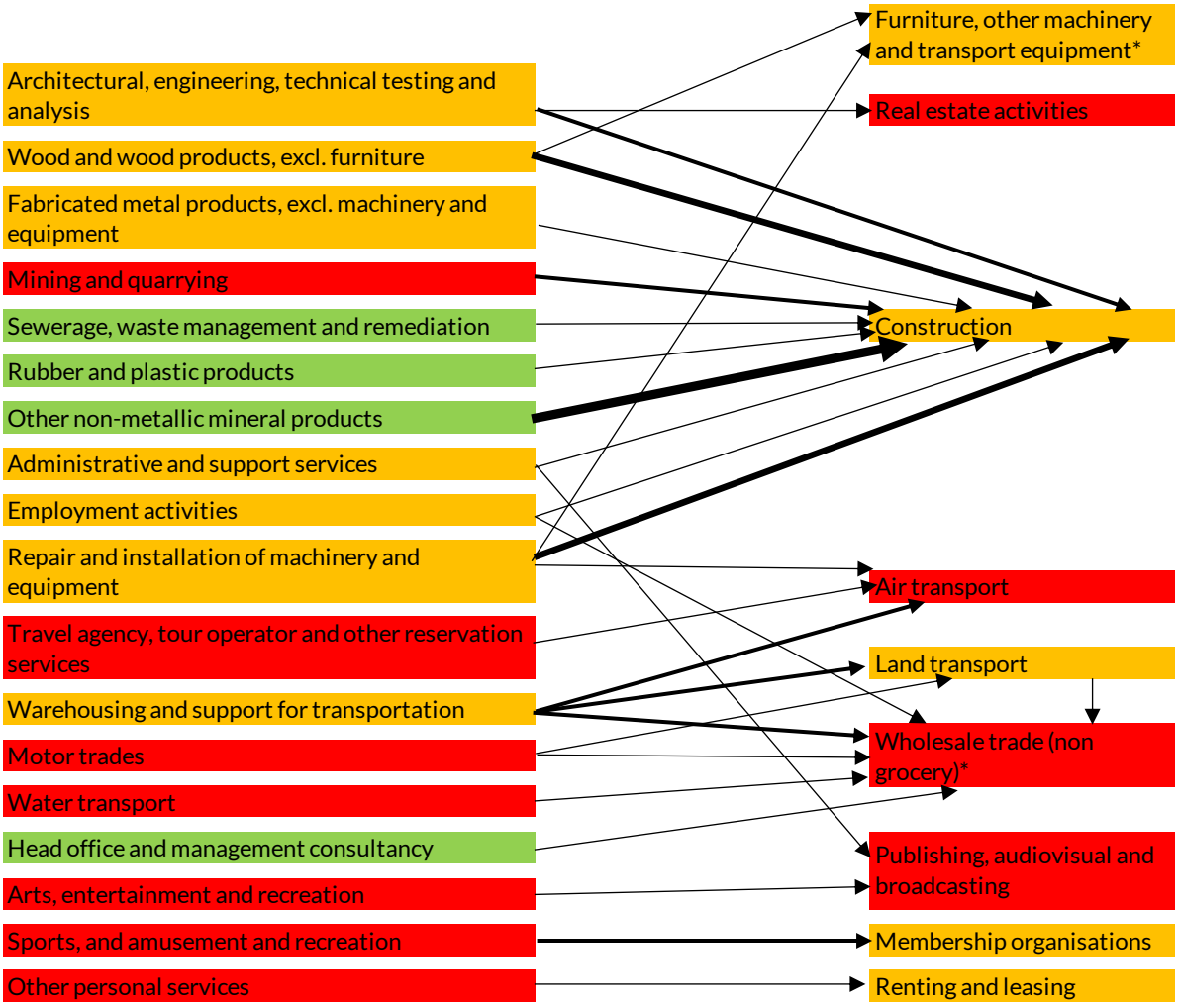
In some cases, the level of overall sectoral vulnerability is driven by strong links to a specific subsector. Figure 3 shows the flows to a specific *Red* or *Amber* sector that constitutes over 5% of output of the suppliers. Although flows from *Red* or *Amber* sectors to other *Red* or *Amber* sectors are important, as they increase the vulnerability of already-vulnerable sectors, it is notable that some *Green* sectors rely on downstream vulnerable firms for their sales. The Other Non-metallic Mineral products sector, for example, sells over 30 per cent of its output to the Construction industry.

At the firm level, these links are likely to be even stronger in some cases. If firms within sectors specialise in serving specific types of customers, they are more likely to be vulnerable. Thus, while inter-sectoral linkages can provide indications of where transmission channels are likely to be strongest, they are not predictive of vulnerability at the firm level.

Table 3: Sectors with largest % of total output going in business-to-business flows to vulnerable sectors

Sector	% of total output
Warehousing and support activities for transportation (52)	60
Repair and installation of machinery and equipment (33)	54
Other non-metallic mineral products (23)	47
Administrative and support service activities (80 to 82)	44
Employment activities (78)	43
Architectural and engineering activities technical testing and analysis (71)	39
Wood and wood products, except furniture (16)	37
Motor trades (45)	29
Legal and accounting activities (69)	29
Water transport (50)	29

Figure 3: Sectors that sell more than 5% of output to a specific *Red* or *Amber* sector.



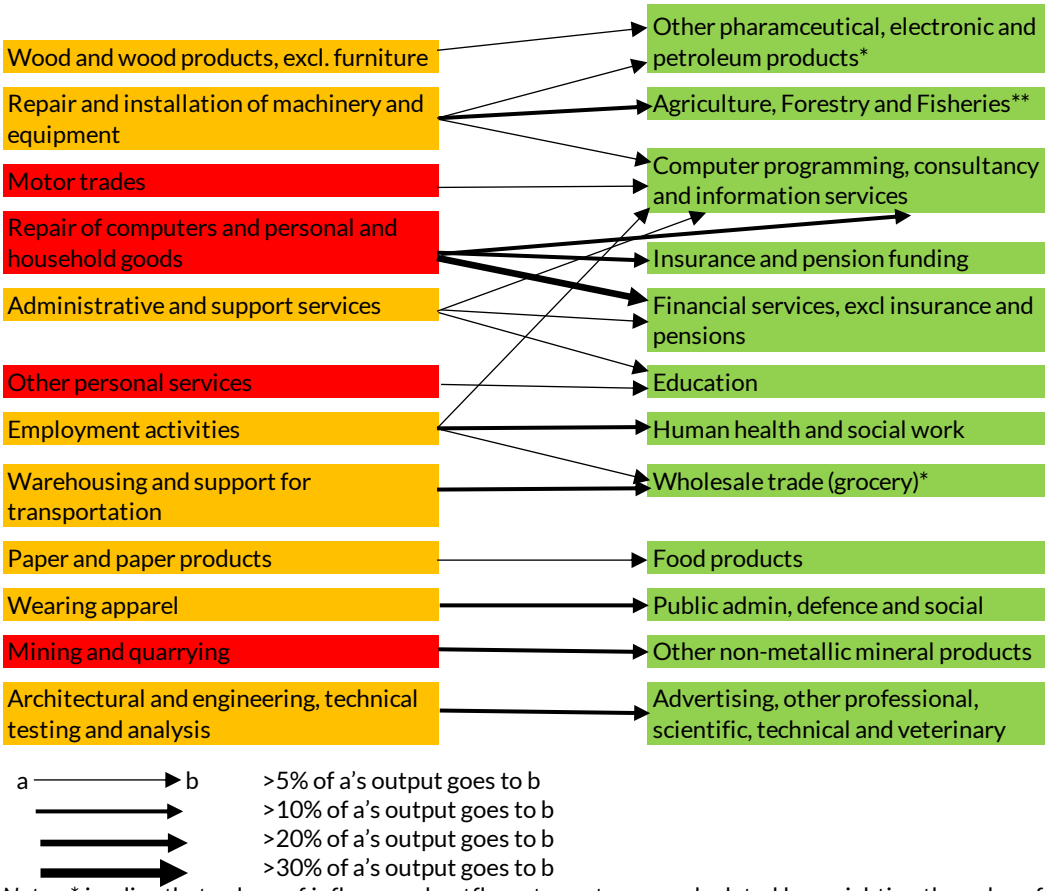
a → b >5% of a's output goes to b
a → b >10% of a's output goes to b
a → b >20% of a's output goes to b
a → b >30% of a's output goes to b

Notes: * implies that values of inflows and outflows to sector are calculated by weighting the values for the higher NACE code sector. In the case of wholesale trade (non-grocery), the weighting is 60% of total wholesale trade. In the case of furniture, other machinery and transport equipment, the weighting is 50% of manufacturing n.e.s. Weightings are based on employment, turnover and number of enterprises in the relevant subsectors.

Certain supply chain linkages may mitigate the liquidity shock arising from COVID-19 containment policies. Overall, around 8.5% of *Red* and *Amber* sales are made to *Green* sectors, rather than to end users or to other *Red* or *Amber* sectors. While this proportion is small, it masks considerable heterogeneity across the sectors.

Figure 4 shows all relationships where more than 5% of a *Red* or *Amber* sector's output is sold to a *Green* sector. Even if sales are reduced due to constraints imposed on the *Red* and *Amber* sectors, these links may improve resilience as existing trade credit obligations are more likely to be met from *Green* sector firms. For example, it is clear that a significant quantity of the output of the Computer and Household Goods Repair industry is sold to intermediate industries that are less likely to suffer from a liquidity shock, and it may therefore be less vulnerable than initial analysis would suggest.

Figure 4: *Red* or *Amber* sectors that sell more than 5% of output to a specific *Green* sector.



Notes: * implies that values of inflows and outflows to sector are calculated by weighting the values for the higher NACE code sector. In the case of wholesale trade (grocery), the weighting is 40% of total wholesale trade. In the case of furniture, other pharmaceutical, electronic and petroleum products, the weighting is 50% of manufacturing n.e.s. Weightings are based on employment, turnover and number of enterprises in the relevant subsectors. **Agriculture, forestry and fishing contains the fishing subsector, which has been deemed Red. Fisheries represents approximately 2 per cent of total employment in the sector.

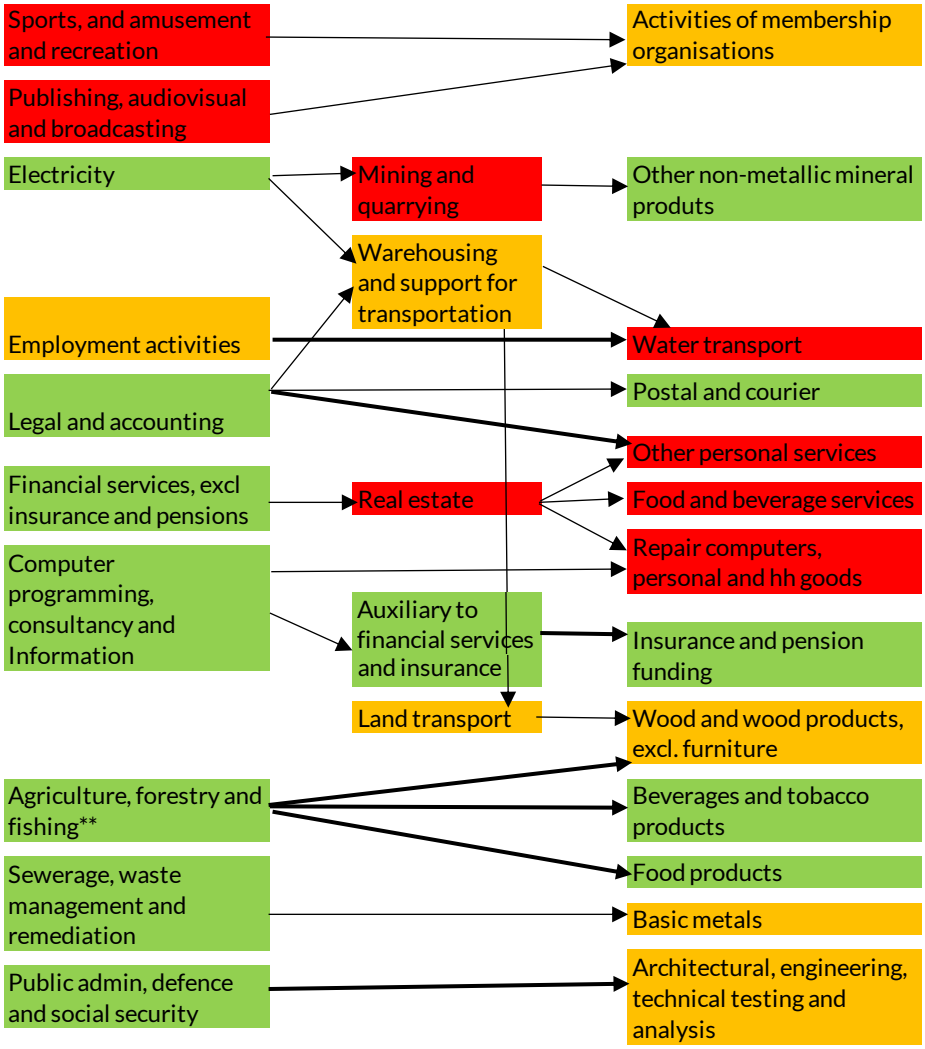
3.3 Input Sourcing Instability

The final way in which proportional links can generate instability is with respect to the reliance of firms on COVID-19 affected firms for inputs. These effects, which are often *downstream* in nature from suppliers to final goods producers, have been highlighted more frequently in the supply chain disruption literature, e.g. Barrot and Sauvagnat (2016), In the current environment, the more immediate liquidity shock is heading *upstream* in the supply chain due to COVID-19, i.e. from final goods/services producers with lost revenues to their input suppliers.

If firms in vulnerable sectors cease to operate, then firms relying on inputs from those sectors may struggle to maintain output. For example, the Computer Programming sector obtains over 10 per cent of its inputs from the Computer and Household Goods Repair sector. Should their suppliers cease to operate, they may struggle to source repairs.

All input relationships between sectors where the selling sector represents more than 5 per cent of the inputs of the purchasing sector are outlined in figure 5. At the sectoral level, there appear to be fewer strong input links than strong output links. Furthermore, many of the strongest input relationships involve a *Green* supplier, suggesting that domestic supply chains should be comparatively robust. The nature of the COVID-19 shock is such that upstream liquidity shocks from firms that rely on customer-facing interaction are much more likely to be an issue than the downstream shocks that typically characterise natural disaster disruption.

Figure 5: Sectors that purchase more than 5% of their input from another specific sector.



a → b >5% of b's input comes from a
a → b >10% of b's input comes from a
a → b >20% of b's input comes from a
a → b >30% of b's input comes from a

Note: **Agriculture, forestry and fishing contains the fishing subsector, which has been deemed Red. Fisheries represents approximately 2 per cent of total employment in the sector.

4 Conclusion

Linkages through the supply chain represent an important potential transmission mechanism for the COVID-19 shock in Ireland. We have highlighted that substantial economic activity occurs between businesses across sectors in Ireland, and that up to €40bn of annual sales of suppliers are to companies that are either highly or moderately affected by the restrictions placed on the economy as part of the public health response to COVID-19. Given that trade credit is used heavily in Ireland relative to other European countries, a lack of liquidity among firms directly affected by current restrictions risks cascading through the supply chain, in the form of missed payments for goods and services already provided but unpaid as of early March 2020. Furthermore, future demand from firms affected directly by COVID-19 will lead to knock-on effects on firms upstream if the liquidity dry-up continues, amplifying the economic downturn domestically beyond those firms currently unable to meet customer demand. Policy interventions to support enterprise liquidity should consider the importance of supply chains and outstanding trade credit liabilities in maintaining the productive capacity of the domestic Irish economy.

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Appendix – COVID-19 RAG status of sectors

Red Sectors

Name	NACE Code
Mining and quarrying	05 to 09
Motor trades	45
Water transport	50
Air transport	51
Accommodation services	55
Food and beverage services	56
Publishing, audiovisual and broadcasting services	58 to 60
Real estate activities	68
Travel agency, tour operator and other reservation service and related activities	79
Arts, entertainment and recreation	90 to 92
Sports activities and amusement and recreation activities	93
Repair of computers and personal and household goods	95
Other personal service activities	96
Wholesale trade (non-grocery)[1]	46
Retail trade (non-grocery)[2]	47

Amber Sectors

Textiles	13
Wearing apparel	14
Leather and related products	15
Wood and wood products, except furniture	16
Paper and paper products	17
Printing and reproduction of recorded media	18
Basic metals	24
Fabricated metal products, except machinery and equipment	25
Furniture, other machinery and transport equipment[3]	28,31,32
Transport equipment	29,30
Repair and installation of machinery and equipment	33
Construction	41 to 43
Land transport	49
Warehousing and support activities for transportation	52
Architectural and engineering activities technical testing and analysis	71
Renting and leasing activities	77
Employment activities	78
Administrative and support service activities	80 to 82
Activities of membership organisations	94

Green Sectors

Agriculture, forestry and fishing[4]	1 to 3
Food products	10
Beverages and tobacco products	11,12
Other pharmaceutical, electronic and petroleum products[3]	19,21,28
Chemicals and chemical products	20
Rubber and plastic products	22
Other non-metallic mineral products	23
Electrical equipment	27
Electricity, gas, steam and air conditioning supply	35
Water collection, treatment and supply	36
Sewerage, waste management and remediation activities	37 to 39
Wholesale trade (grocery)[1]	46
Retail trade (grocery)[2]	47
Postal and courier activities	53
Telecommunications	61
Computer programming, consultancy and Information service activities	62,63
Financial service activities, except insurance and pension funding	64
Insurance, reinsurance and pension funding, except compulsory social security	65
Activities auxiliary to financial services and insurance activities	66
Legal and accounting activities	69
Head office and management consultancy activities	70
Scientific research and development	72
Advertising, other professional, scientific, technical and veterinary activities	73 to 75
Public administration and defence, compulsory social security	84
Education	85
Human health and social work activities	86 to 88

Notes to tables

[1]Wholesale trade (grocery) values are calculated by taking a weighting of 40 per cent of the wholesale trade sector, and Wholesale trade (non-grocery) values are calculated by taking a weighting of 60 per cent of the wholesale trade sector. Weightings are based on employment, turnover and number of enterprises in the relevant subsectors.
[2]Retail trade (grocery) values are calculated by taking a weighting of 40 per cent of the retail trade sector, and Retail trade (non-grocery) values are calculated by taking a weighting of 60 per cent of the retail trade sector. Weightings are based on employment, turnover and number of enterprises in the relevant subsectors.
[2]Furniture, other machinery and transport equipment values are calculated by taking 50 per cent of the values reported as Manufacturing N.E.S. Other pharmaceutical, electronic and petroleum product values are calculated by taking the other 50 per cent of the values reported as Manufacturing N.E.S. Weightings are based on employment, turnover and number of enterprises in the relevant subsectors.
[4]Agriculture, Forestry and Fishing contains the fishing subsector, which has been deemed a *Red* sector. Fisheries represents approximately 2 per cent of total employment in the Agriculture, Forestry and Fishing sector.

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